ON

THE FUNCTIONS OF THE BRAIN

AND

OF EACH OF ITS PARTS:

WITH

OBSERVATIONS ON THE POSSIBILITY OF DETERMINING THE INSTINCTS, PROPENSITIES, AND TALENTS, OR THE MORAL AND INTELLECTUAL DISPOSITIONS OF MEN AND ANIMALS, BY THE CONFIGURATION OF THE BRAIN AND HEAD.

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THE

INFLUENCE OF THE BRAIN

ON THE

FORM OF THE HEAD:

THE DIFFICULTIES AND MEANS

OF DETERMINING THE FUNDAMENTAL QUALITIES AND FACULTIES, AND OF DISCOVERING THE SEAT OF THEIR ORGANS:

EXPOSITION

OF THE FUNDAMENTAL QUALITIES AND FACULTIES, AND THEIR SEAT, OR ORGANOLOGY.

By FRANÇOIS JOSEPH GALL, M. D.

TRANSLATED FROM THE FRENCH

By WINSLOW LEWIS, Jr., M.D., M.M.S.S.

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FUNCTIONS OF THE BRAIN.

SECTION I.

ON THE INFLUENCE OF THE BRAIN ON THE FORM OF THE CRANIUM, OR AN EXAMINATION OF THE QUESTION, — IN WHAT CIRCUMSTANCES CAN WE DERIVE, FROM THE EXTERNAL FORM OF THE CRANIUM OR HEAD, INDUCTIONS RELATIVE TO THE DEGREE OF DEVELOPMENT OF THE BRAIN, AS A WHOLE, OR TO THAT OF ANY OF ITS PARTS, — AND CONSEQUENTLY FORM A JUDGMENT OF THE DEGREE OF THE MORAL AND INTELLECTUAL DISPOSITIONS, BY THE EXAMINATION OF THE EXTERNAL FORM OF THE CRANIUM OR HEAD?

In the first volume of this work I have proved, that the instincts, propensities, and faculties are innate, in animals, as well as in man, and that, in this life, the manifestation of none of these dispositions is possible, without the aid of material instruments.

In the second volume, I have shown, that, of all the parts which constitute animal organization, the brain is the only one, which can be exclusively regarded as the instrument, by which the moral qualities and intellectual faculties are exercised.

Finally, I have proved that the brain is composed of several organs, constituting as many particular material instruments, as there are moral qualities and intellectual faculties, essentially distinct.

Now the question arises, whether, in the doctrine of the cerebral functions, we should adhere to general

principles, or whether there are any means by which we can determine the functions of each part of the brain, and establish the seat of each of the organs of the fundamental moral qualities and intellectual faculties.

All my predecessors, even those who admit the existence of a plurality of mental organs, have failed in their attempts to determine the seat of each of them; and it is by an examination of the form of the crania and heads, and comparing this with the moral qualities and the intellectual faculties, with which such individuals are endowed, that I have finally succeeded.

How is it possible to do this? Does there exist, then, a relation or an exact correspondence between the brain, the cranium, and the head? The possibility of resolving this question, supposes that the organs of the mind are situated on the surface of the brain; that they are more or less depressed, more or less flattened, more or less elevated, larger or smaller, according as the exercise of their functions is susceptible of more or less energy; that these varieties of form of the particular cerebral parts are developed on the surface of the cranium and head; propositions which require a rigorous demonstration.

I have proved, in the second volume, that the disposition to functional action is as much more energetic, as the sound organ, other things being equal, has received a more considerable development; and as it respects this, I have entered into all the necessary details. The following observations will constitute an answer to the question, — How far does truth bear us out in saying, that the organs of the soul are situated on the surface of the brain?

We must recollect, that each nerve, after being sufficiently increased, is ramified and spread out in that part where it is destined to act. The nerves of sensibility and motion are distributed to the skin and muscles; the nerves of the senses are each ramified

on the external organ to which they belong. For example, the olfactory nerve is spread out upon the pituitary membrane of the nose; the nerve of taste termimates in minute branches in the tongue; the expansion of the optic nerve forms the retina.

The part in which the nerve is thus spread out, is not, in fact, the whole of the organ, but, from the extent of the expansion, we may infer the size of the nerve itself. The surface on which the olfactory nerve is spread. out in the dog and horse, is much greater than in man. Hence, from its origin to its minute ramifications, this nerve is larger in these animals than in our species.

Nature follows precisely the same law in the brain. The different cerebral parts arise and increase in different places; they form larger or smaller fibrous bundles, which terminate in ramifications. All these ramifications of the different fibrous bundles, when re-united, form the hemispheres of the brain.

These hemispheres are simply a nervous membrane, one or two lines in thickness, covered, on the whole of its external surface, with a greyish, pulpy, or gelatinous substance.

Let us imagine this great nervous membrane, as we see it in large dropsies of the brain, folded like a furbelow, so that each fold shall be twelve or sixteen lines in depth, (more or less,) we shall then have their convolutions, the intervals of which have received from anatomists the name of anfractuosities, and we shall have also the two hemispheres, such as nature has placed them in their folded state in the cranium. The ramification of the olfactory nerve forms analogous folds in the alæ of the nose.

A small nervous bundle can form only a small ramification, and consequently but minute folds; and but one or more small convolutions. A considerable nervous bundle, on the contrary, forms an extensive and thick ramification, and consequently, folds and convolutions of much greater volume.

Thus, then, although all the integral parts of any one cerebral organ, from their origin to their termination, are not situated on the surface of the brain, nevertheless, we can deduce from the size of the fold, or convolution, positive inferences as to the volume of the whole organ. The longer, deeper, and broader the convolutions are, the more space do they occupy, and the more are they elevated above those that are shorter, narrower, and more superficial; so that a brain, the integrant parts of which have acquired an unequal development, exhibits on its surface depressions, level parts, and eminences.

In some cases, the ramification of a nervous bundle or organ, is folded into a single convolution; in others it forms many.

The folds or convolutions do not all assume the same direction. Some run straight from before backwards; others go transversely from above laterally; others again take an oblique direction; almost all go somewhat in a serpentine course. Some form pyramids; others run spirally, &c.

The fundamental forms of these convolutions are the same in all human brains, and they correspond in the two hemispheres of the same brain; in a word, they are symmetrical.

In small brains, as those of the dog, horse, ox, sheep, &c., this symmetry is perfect; in man, small divisions vary in their forms. (Pl. III. and XIV.)

All the forms of the principal divisions, when these last have acquired a great development, are manifested on the cranium under the same type. Hence result the different forms and directions of the organs, which I have delineated on the surface of crania and busts.

This explains the relation or correspondence that exists between craniology and organology, or the doctrine of the functions of the different parts of the brain, (cerebral physiology,) — the sole object of my researches.

How can it be proved that the external surface, as well as the internal surface of the cranium affords a faithful impression of the external surface of the brain, and consequently, becomes the principal means, not only of discovering the original powers of the mind, but further — the means of determining the seat of their organs?

For more than twenty years that I have taught this truth, with the exception of some of my auditors who have published my lectures, few authors have paid any attention to it. Galen long since said that the cranium is moulded on the brain, and not the brain on the cranium.* Du Laurens† and Diemerbroek‡ taught the same thing in the seventeenth century. In 1743, Fischer wrote a particular treatise on this subject.§ Lavater‖ and Blumenbach, from whom I have borrowed these observations, were equally convinced of the truth of this. M. Spurzheim has proved it at length in his work,¶ and we have also inserted in the Dictionary of Medical Sciences a short article on the same subject.**

As this object is not only of the greatest importance in the science of Organology, but is even absolutely essential to the existence of the doctrine, I shall treat it more in detail than it has heretofore been done, and shall consider it under all the points of view, offered both in health and in disease.

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* De usu partium, lib. viii.
† Hist. Anat. p. 139.
‡ Anat. Corp. human. p. 554.
§ Dis. de modo quo ossa se vicinis accommodant partibus. Lug. Bat. 1743.
‖ Phys. frag. t. ii. p. 165.
¶ Physiognom. Sys. p. 217 et suiv.
** Med. Sci. t. vii. p. 260 et suiv.

A View of the Osteology of the Cranium, so far as is necessary to enable us to understand the Influence that the Brain exercises on this osseous Structure.

In the examination of the forms of the cranium, the organologist has no other object in view, than to determine the degree of development of the cerebral parts; consequently only those parts of the cranium, whose form depends upon the brain, have an interest for him.

The jaws, the mastoid processes, and all the other bony prominences, have nothing in common with the brain, and consequently do not contribute in the least degree to the development of the form of the cranium. We have only to concern ourselves therefore with the osseous box of the brain.

This box is composed of eight bones, viz., 1. the sphenoidal; 2. the frontal, which at the period of birth is in two parts, which are afterwards united together, and in the adult constitute but one bone; 3. the two temporal; 4. the occipital; 5. the two parietal; 6. the ethmoidal.

These bones are united together by sutures in such a manner as to form one great cavity, which contains the brain and some other nerves. On this account it is called the cerebral cavity, or the bony box of the brain.

Plate VIII. represents the brain seen in profile, in its natural situation in the cranium. Plate IX. represents the same seen from above. Plate XI. represents a vertical section which divides the whole brain into its two symmetrical halves. Plates X. and XII. also represent the brain seen in profile, and exposing a part of its internal structure. Plate IV. shows the whole brain as seen from its base. Plate XIII. also represents the brain seen by its base, situated in the cranium, some of its parts being prepared. In all these brains, the convolutions are exposed, the vascu-

lar membrane, which follows them in all their anfractuosities, and which furnishes sanguineous vessels to all the nervous fibrils, having been removed.

It will be seen by these engravings, all of which represent the brain in its natural dimensions, that the whole cavity of the cranium is filled by the brain; and that throughout it is in contact with the internal surface of the cranium.*

I shall hereafter give a more detailed description of the bones of the cranium, so far as their form varies, and where this variety of form has a bearing on Organology. Now we proceed to the examination of the question — whether the internal as well as the external surface of the cranium, manifests the impress of the surface of the brain? In this inquiry, I shall commence with examining these organs in the healthy condition, and conclude with remarks upon them in a state of disease.

The Influence of the Brain on the Cranium previous to Birth.

In the first few weeks after conception, the brain is not yet surrounded by any osseous substance. It is covered by four membranes; the pia-mater or vascular membrane; the arachnoid; the dura-mater, composed of two layers; and a transparent cartilaginous membrane. All these membranes exactly envelope the surface of the brain; they ought then to represent with exactness its convolutions externally.

About the seventh or eighth week, there is formed in the cartilaginous membrane as many points of ossification as there exist bones in the cranium. To these points new bony molecules are gradually add-

* I need not observe to anatomists, that the regions of the internal surface of the cranium, corresponding to the longitudinal and lateral sinuses, are an exception.

ed; and in this way diverging rays are formed from a central point of ossification. (Pl. XXXVI. fig. 1.) The intervals of these radii are by degrees filled up with bony matter. In this manner osseous plates are formed, which soon meet each other at their edges.

Sometimes we can distinguish the traces of this radiated crystallization, even many years after birth. The place where each of the bones of the child is hardest, was in the fœtus the point of ossification. It is found near the middle of each bone.

Now, as the deposition of the bony matter follows the direction of the cartilaginous membrane, and as this is moulded upon the brain, it follows necessarily that the cranium is moulded upon the brain.

So far no one has contradicted me, in what I have advanced on this subject. Never has a child been born with a head of a shape similar to that, which it assumes in the adult age. Among the heads of new-born infants we do not observe near so great a difference, as between those of adults. Does not this lead to the presumption, that the form of the head is determined by external and accidental circumstances?

The Forms of the Crania and Brains differ originally.

Hereditary resemblances in the countenance, as well as in the forms of the other parts of the body, prove abundantly that future forms are determined at the moment of conception. I mean by future forms, the tendency to those forms which the parts afterwards assume. A child is never born with an aquiline nose, but the nose of such a new-born child, as well as all its other parts, have a tendency to adopt certain forms.

This is the reason why the forms of the different parts differ originally in different infants, to so great a degree that an attentive observer, who would de-

vote the necessary time to this study, might determine from the forms of the fœtus, what would be the forms of the adult.

Sœmmerring, and many accoucheurs, as well as myself, have constantly found varieties of forms in different heads of new-born children. It may then be admitted that the future form of the head is originally impressed upon it. It is reasonable, however, that we should except from this law those cases, where the *nisus formativus* is opposed by external violence.

Can the Form of the Head be modified, either during the Birth of the Child, or by Compression or Malaxation?

Some physiologists seriously pretend, as M. Fodéré,* and others maintain ironically, that, as a consequence of craniology, all our dispositions and talents would depend upon the form of the pelvis, the action of the forceps, or the dexterity of the midwife. Even in common accouchements, children come into the world with heads very much deformed; but this malformation does not concern the brain, nor the osseous box that encloses it. It only takes place in the soft parts. The compression that the head undergoes in its passage through the pelvis, causes a stagnation in the fluids, which makes a tumor between the top of the head and the occiput. Consequently the head acquires an elongated form. But the circulation is soon reëstablished, and the head of the child resumes the *form which it had in the womb of its mother.*†

* Traité du Delire, tom. ii. p. 128.

† In the books of physiology and midwifery, we read: "The head (of the fœtus) will separate easily from the body, if the lower jaw is caught over the junction of the pelvis; because the base of the cranium and this jaw resist in their whole extent, and together present an extensive surface incapable of yielding, as the top of the head does in common accouchements, where the bones, slipping in part over each other, form a conical figure, which facilitates delivery." — (Levret on Difficult Parturition.)

If there are midwives so inconsiderate as to undertake to give fanciful forms to the heads of children, by pressing and moulding them, at least they do not

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"When the head is elongated in parturition, it is always in the direction of its oblique diameter, so that the point of the cone, which it then represents, is above the posterior angle of the parietal bones. But it cannot undergo this change without diminishing in thickness from side to side, and often from the summit to the base." — (Baudeloque, Accouchements.)

"As in the fœtus, the osseous pieces of the cranium are numerous, thin, flexible, and united together only by extensible membranes, the head, either by the efforts of expulsion, or by pressure, can elongate from the occiput to the chin, at the same time that it is flattened from one parietal bone to the other; and we have seen the parietal diameter reduced to two inches and seven lines." — (Chaussier.)

"Ut idem caput nixibus, ac pelvis renisu, ossiumque bregmatis precipue mollitie, mobilitate, eorumque reciproca susceptione in acumen desinat, atque, ut in omni pelvis regione opportet fieri, ab una ad aliam plagam informam cogatur minorem, aliaque extenuetur in majus." (*Doctoris Lucæ Johannis Boëiri naturalis medicinæ obstetriciæ Libri septem.* Viennæ, 1812: p. 441.)

"Nature, in forming the head of the fœtus of flexible pieces, intended to facilitate parturition. These pieces, being separated by unossified and membranous intervals, allow the bones to slide over each other, and thus the whole head is in a measure reduced, and slides through the narrow outlet of the pelvis." — (Richerand, Physiology.)

In order to fix my ideas on the changes, which the head of the infant is susceptible of experiencing by compression, caused either by the pelvis or the forceps, I have, as I am always accustomed to do, shut up my books and consulted nature. In presence of M. Dannecy and others, we made experiments on the heads of new-born infants that were well formed. After having removed the hairy scalp, we compressed them in every direction, with a very considerable force. Finally, we compressed the cranium with so much force by means of forceps, that the blood transuded through the pores of the bones.

In eight heads submitted to our experiments, seven exhibited not the least trace of overlapping. One only manifested the following phenomena: —

When the forceps was applied in the longest diameter, that is to say, from the forehead to the occiput, and when a strong effort was made, the superior part of the os occipitis glided under the posterior borders of the parietal bones to the extent of nearly two lines. This certainly is not the *overlapping* of which accoucheurs speak.

The greatest diameter of almost all the heads of new-born children is not in the protuberances or points of ossification of the parietal bones which do not yield to any force, but below and a little in front of these protuberances, nearly in the inferior part of these bones. Now, when we applied force to this part, it became depressed. The same thing happened when force was applied to the superior part of the frontal bone, or on the anterior superior part of the parietal bones. A depression of the interior middle part of the parietal bones pro-

succeed. The entire form of the head results from the form of each of the bones of the cranium; and the form of these bones cannot be altered by compression or malaxation.

If, however, the violence that is used be too great, the osseous laminæ might be bent and depressed, and in this case, the child will be destroyed, or remain imbecile during life. But all the cranial bones are still very elastic in the new-born child. The moment the pressure ceases, they resume their original form. In those cases even, where they have been so pressed that their proper elasticity is not sufficient to restore them to their first form, the brain re-acts upon them; and when this has not been essentially injured, their primitive form is reëstablished at the end of a certain period, sometimes only after many years. The same thing happens, when the bones of the cranium are depressed by the narrowness of the pelvis, or, by the application of instruments.

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duced a swelling of the superior parts of the head, and *vice versâ*, but in no instance did the head assume a pointed form. If the pressure, in whatever region applied, is too strong, the brain is crushed, and extravasations of blood take place, especially from the great sinuses.

There is a great difference between the trifling *overlaying* which I have just described, and that extreme sliding of the bones over each other, which causes the head to assume a pointed form, and glide in a manner across the narrow passage of the pelvis; which necessarily supposes a considerable reduction.

In the whole length of the suture of the parietal bones, the edges of these two bones are not in the same plane, but one rises above the other. In touching the head, this anatomical configuration might be easily mistaken for an *overlaying*. Hence, I believe, arises in part the mistake of the accoucheurs.

In those cases, where a violent pressure is occasioned, either by the use of instruments, or by the narrowness of the pelvis, certain regions of the head may be considerably depressed; but then greater or less injury happens to the child.

I have further observed, that very small heads, where the bones are extremely flexible, sometimes suffer the most, so much so, that occasionally even the death of the child ensues. This is an important circumstance in legal medicine; and those who have to decide on presumed infanticide, cannot bestow too much attention upon it.

The Influence of the Brain upon the Cranium from Birth to adult Age.

A short time after birth the bones of the cranium grow hard; they lose their flexibility, unite by their edges; the membranous intervals, the *fontanelles* ossify. Is it possible, in these circumstances, that the brain should be able to imprint its form on those bones which have become hard? Let us first examine what happens to the cerebral mass, as a whole, and to the cavity of the cranium. After this examination we will pass to the consideration of the development of the cerebral parts, in particular, and of the changes which this development produces on the cranium.

The brain of a child two years of age evidently has more volume, than that of an infant just born or even a year old.

Compare the head of a new-born child (Pl. XII.) with the head of a boy of two years (Pl. XXXVII.), and that of a little girl of six years (Pl. XXXVIII.), and these two last with heads (Pl. XXXIX. XL.) of adults. The head of a new-born child is from thirteen to fourteen inches in circumference; those of adults are from twenty to twenty-one inches and a half. The brain of a boy or girl is larger at ten years, than it was at two or six, &c. The cerebral cavity, and consequently the whole contour of the head, enlarges in the same proportion as the brain increases in size; and this simultaneous enlargement continues so long as the head grows. This fact sufficiently shows that the cranium yields constantly to the brain, which augments in volume; and, as the bones of the cranium are very thin until the age of puberty, hardly half a line in thickness, it follows of course, that the external outline of the cranium is precisely similar to the surface of the brain.

The thickness of the cranium represented in Plates IX. and XII. is the ordinary thickness in adult age, that is to say, from one to two lines. We see farther in these same plates, and by Plates VIII. X. and XI. that the brain, in the whole of its outline, is exactly applied against the internal surface of the cranium; for, in a state of health, the intervening membranes are not to be considered.

In examining the internal surface of the cranium of a subject, who has not died of a chronic cerebral disease, we shall observe that the great blood vessels of the dura-mater are very exactly impressed upon it; we see also there the impressions of the pretended glands of Pacchioni, and the returning sinuses. Even at this age the convolutions are found very distinctly impressed on the inferior table of the orbitar plate, the inferior anterior part of the frontal bone, and in the temporal bones. When from any cause the membranes of the brain become thinner than natural, we then distinguish the impression of the convolutions on the whole internal surface of the cranium. I make one observation, in passing, that in the majority of hydrocephalic subjects we find the hairy part of the head covered with a furfuraceous exanthema. For example, in the hog, goat, roebuck, stag, sheep, ox, cat, dog, marten, polecat, the smaller phoca, ape, &c.

Some physiologists have thought, that the enlargement of the osseous box was caused by the pressure, which the brain exercises on the internal surface of the cranium; but there does not exist in living organization any like mechanical action. There is continual absorption, secretion, nutrition, decomposition, and new formation. The osseous molecules are absorbed, and others are secreted in their place; and so long as the brain and the cranium have not acquired their maximum of growth, secretion is more considerable than absorption. New juxtapositions take place in consequence of the same laws, that were fol-

lowed in the formation of the bony osseous laminæ in the fœtus, that is to say, that the contours of the brain constantly follow.

Hufeland and Fodéré set out from this same mechanical point of view, when they say, that in countries where the inhabitants carry considerable weights upon the head, the cranium ought to be compressed inward, and consequently the organs situated at the superior part of the head, depressed.

But, supposing even that the brain exercises a mechanical pressure against the internal surface of the cranium, as may really happen in the case of hydrocephalic patients, who grow rapidly, we must not forget that the brain acts on the concavity of the vault, and the compressing weight of the convexity; but every one, who has the least idea of the theory of the arch, or even any person who has only attempted to crush an egg in the hollow of his hands when joined together, it being placed in the direction of its longest diameter, can easily conceive what resistance the arch of the cranium is capable of opposing.

I pass over in silence the objections, that others have urged against the idea of Hufeland and Fodéré. For the rest, we have found in the form of the head of the inhabitants of these countries, as great diversities as in that of other men. We have found in them the organs of firmness, of pride, &c., placed near the top of the head, as strongly developed as in other people.

We are told that certain savages of America apply to the forehead of their children little flat plates, by means of which they depress the superior part of the frontal bone.* As M. Spurzheim has had better opportunities than myself of making observation on this subject, I will transcribe here what he says in relation to it.

"I have seen seven crania of Caribs; they have

* Dict. des. Sci. Med. tom. xxi. p. 268 et suiv.

very little elevation, and are particularly expanded in the temporal region, but on comparing one with another, I find as great a difference as is usually observed in comparing an equal number of European crania.

"I have seen European crania much less elevated; consequently the want of elevation in question cannot be owing to mechanical depression alone. The surface of the crania of the Caribs, was even more or less developed, and consequently manifested in no part the impression of a plate. It seems to me, that all that is related of the method of flattening heads, refutes itself. It would require a very considerable force to compress the cranium and brain; but this force cannot act from above downwards, unless it is opposed by an equal resistance from below upwards, or in some other direction; but, if the pressure from above downwards produced any effect whatever, the resistance from below upwards, or in any other direction, ought to produce an equal effect."

Since the publication of the first edition of my work, I have conversed with many people who have been at the island of St. Vincent; but their reports are contradictory, and do not clear up my doubts. "Some say that they leave this plate on the head of the infant six weeks; others pretend that it is left there, six months; and others say, two years," &c.*

In those Caribean crania, that we saw in the possession of M. Blumenbach, where the anterior part of the forehead is forcibly depressed, the orbits have the same depressed form, which they assume in hydrocephalic subjects from the pressure of the water.

Is the brain of the Carib more naturally developed in the temporal region, and towards the base of the brain, or is this form artificial? This, according to the observations of M. Spurzheim, can hardly be admitted. There must have been then, in this case, permanent action by a hard and inflexible body; an ac-

* Phys. Sys. p. 220.

tion which cannot be compared to any other influence from without. After all, we are very far from applying craniology to deformities resulting from violence.

Up to this point I have heretofore left the question undecided. But I have since found in Lafitean, a passage which appears to me conclusive; it is this: "Some tribes in the vicinity of Louisiana, who are called by the French, Flat-heads, because they deem a flat forehead a mark of beauty, and have the summit of the head terminating in a point like a mitre, have cradles nearly similar to those I have just described, but besides this have something particular to cause them to assume this form, which they find so agreeable. It is a hole made in the cradle, in which the mother places the head of the child, applying to its forehead and the top of the head, a mass of clay, which she presses with all her strength. She repeats this application to the child's head every night, until the bones of the cranium have acquired sufficient consistence. Children suffer extremely in the first attempts of this violent operation, which causes them to turn black, and there runs out from the nose, the eyes, and the ears, a white and viscous fluid. They afterwards suffer much from the uncomfortable situation, in which they are obliged to pass every night of the first months of their infancy. But this must always happen to those who would be beautiful by art, and who wish to have charms that nature has denied them.

"The Caribs, and most of the southern savages, have the forehead flattened, and the head pointed. Their mothers take care to press it in with little flat plates, and small cushions of cotton firmly bound to the back of the head. But the children have no other cradle but little hammocks, proportioned to their size, which their mothers can suspend, and carry very conveniently, and in which the infants are placed entirely naked without any constraint. The savages, who are called in Canada, 'People of the earth,'

or the *Parhagonronnon*, have quite a different taste, for they consider beauty as consisting in a round head. On this account they are called 'Round-heads.'" *Customs of the American Savages*, &c., by Father Lafitean, Vol. I.

The Influence of the Development of individual cerebral Parts on the Form of the Head.

It has been demonstrated, in another place, that the development of the different cerebral parts is not simultaneous. Now, if it be true that the cranium is moulded upon the brain, I ought to be prepared to follow the successive developments of the cerebral parts, by means of the changes which take place in the cranium. Let us see if experience will still confirm my doctrine. The new-born infant remains, for some time, a stranger to the external world. Its life is scarcely more than vegetative, he passes it in sleeping and sucking. The part of the brain, situated in the anterior superior regions of the forehead, appears to the eye a mere reddish pulp.* But, at the end of some weeks, the nervous fibres are more and more apparent. The child begins to be a citizen of the world. At the end of nearly three months the middle and anterior superior parts of the forehead, until now perpendicular, or flattened backwards, begin to swell out. (Pl. XLI.) From this period, the child observes and regards with attention all objects in his way; he compares them with each other; the extent of his knowledge, acquired in a few years in relation to the world without him, is enormous, and he astonishes us with his questions and observations. But later, these frontal parts, in most individuals, put

* I only speak here of a brain that has undergone no preparation. I am not ignorant, that when it has been macerated in spirits of wine it manifests a fibrous structure.

themselves in a sort of equilibrium with the other parts of the brain, and the little prodigy resumes his place among ordinary people.

Let any one compare the forehead of a new-born child, with that of one from one to ten years of age; provided the individual that is observed, is not condemned by nature to a lamentable mediocrity, he will find that in the early months the forehead is small, narrow, short, and nearly perpendicular; but departing from this epoch, it dilates in all directions, and especially forwards; at a later period still, it loses its convexity, so much so as to recede in many subjects. Then it follows, that the form of the head undergoes the same changes, as the cerebral parts situated against the forehead.

The inferior part of the occipital bone undergoes also the most marked changes. The cerebellum is placed in the two occipital fossæ. In the new-born infant it is very slightly developed, in comparison with the rest of the brain; the cranium is contracted in this region, resembling a truncated cone; the external prominences, corresponding to the occipital fossæ, are small, flat, and almost imperceptible; the two mastoid processes are still very near each other, &c. (Pl. XLI. fig. 3.)

But mark the difference in the boy of twelve years! The occipital fossæ are distinctly observed externally by their protuberances; the mastoid processes are much further separated; the posterior base is much larger, &c., and this because the cerebellum is now much more developed in comparison with the other parts of the brain. (Pl. XLII.)

Finally, in more mature age, when the cerebellum has acquired all its development, the prominences, corresponding to the occipital fossæ, are much larger still, so that, in this state of things, the base of the cranium, taken from one temporal bone to the other, almost equals its diameter. (Pl. XLIII.)

But that which takes place in respect to the cere-

bral parts, of which we have just spoken, and their corresponding regions on the cranium, takes place also in the same manner, at the time of the marked development of the other cerebral parts, and as, at the age in question, the cranium is still sufficiently thin, hardly a line in thickness, and in many places much less, we can recognise, with certainty, the form of the brain by the external form of the cranium.*

Coincidence of the Surface of the Brain with the external Surface of the Cranium, in mature Age, as far as Organology is concerned.

It is hardly possible to determine with exactness, either the period of maturity, or the duration of the mature state of the brain. There are some individuals who arrive much sooner to this state than others. The brain of most men hardly acquires its ultimate development till the age of thirty, often even not till forty. After the definitive development of the brain, the cranium thickens by degrees, and in the following manner.

The bones of the cranium are composed of two solid osseous laminæ. One of these laminæ covers all the external surface; the other forms all the internal surface; the interval between the two laminæ is filled with a cellular substance (the diploe); this substance is not of a uniform thickness throughout, so that the two tables are more separated from each other at certain places, than in others. (Pl. VIII. X. XI. XII. XIII.)

Thus then, although the internal surface of the cranium is exactly moulded on the surface of the brain, from the moment when the cranium has acquired a certain thickness, it cannot be asserted without quali-

* All that I have just said of the development of the brain and cranium in our own species, equally takes place in the mammalia and birds.

fication that its external surface exactly represents the convolutions of the brain. For, if we take a cast both of the internal surface of the cranium and its external surface, we shall see that the first does not correspond exactly to the second; hence, the inference that is drawn from the external surface of the cranium, as determining the form of the brain, must be false, and consequently cranioscopy would be, at least in the mature age, a very precarious means for determining with exactness the degree of development of the cerebral organs. (Pl. VIII. X. XI. XII.)

Hufeland, Walter * of Berlin, Rudolphi, and a host of writers who have copied these learned men, have seized upon this fact to prove the fallacy of cranioscopy. Walter even flatters himself with the idea that by this argument, he has destroyed the doctrine of the functions of the different cerebral parts.

In order to show my readers how little solidity this objection possesses, I shall give here the view taken of it by MM. Berard and De Montégre. "Is the cranium the exact and faithful image of the external figuration of the brain, and can we always, in the most rigorous and precise manner, deduce the form of the one from that of the other? If we examine the relation of the cranium to the brain, in all vertebrated animals, especially in man, as affected by differences of national character, as well as by those equally certain, but more delicate ones of age, sex, individual peculiarity, &c., we shall be easily convinced that the cranium generally represents the brain. This opinion, incontestable in this point of view, if it be taken in its details and in its minute application, ought to be limited by the following considerations, the most of which are admitted by cranioscopists."

"1. The frontal sinus, in certain animals, as the carnivorous, swine, some of the ruminating, especially

* Et was über die Schædellehre, that is to say, a treatise on cranioscopy.

the elephant, &c., so bulges out the anterior wall of the cranium, that here we cannot judge of the brain by the cranium. Further, in individuals of the same species these sinuses may be more or less capacious. 2. The orbits which correspond in part to the brain may be more or less deep, more or less open in the same individuals. 3. The base of the cranium may be more or less projecting, more or less flattened. 4. The walls of the cranium may be more or less thick. The Egyptians, according to Herodotus, had much thicker crania than the Persians. Haller has seen a woman whose cranium was so thick, that it required eight minutes to open it in the operation of trepanning. M. Gall believes he has observed that suicides, and other maniacs, often present this peculiarity of organization. The same observer has seen that, in old age, the external table maintains its previous configuration, while the internal one follows the diminution of the brain. 5. The cranium is not uniform in its thickness, its walls are enlarged in certain points, and are raised into eminences; these eminences may vary according to the species and the individuals, even according to the exercise of muscles that are attached to them; although we should not give to this last circumstance too great a latitude, nor understand it in such a mechanical manner as some physiologists have done."*

The circumstance that the two tables of the cranium are not parallel in their whole circumference, and at all periods of life, would certainly be of the greatest importance if I had ever pretended to judge of all the minute shades of difference that exist in the convolutions of the brain, as well as of the differences of detail, which result from these in the exercise of the cerebral functions. But, on the contrary, I have endeavoured to render my hearers and readers acquainted with all the circumstances in question.

* Dictionary of Medical Science, vol. vii. p. 30.

Have I not spoken of the frontal sinus, as well in man as in animals, for instance, in the elephant and the swine; of the separation of the two tables of the cranium in owls, or rather in nocturnal birds; and in general, of the causes of the different forms of the orbits? I have, in my public lectures, insisted on all these points. My pupils, in their writings which they have published in relation to my doctrine, have also insisted upon it. I have insisted upon it in my article *Cranium* in the Dictionary of Medical Science. I was the first to maintain, that it was impossible for us to determine with exactness the development of certain convolutions, by the inspection of the external surface of the cranium. I was the first to treat in detail of the variations in the thickness of the cranium which happen in old age, in insanity, &c. I was the first who remarked, with extreme care, that in certain cases the external table of the cranium is not parallel to the internal one. I have called the attention of anatomists to all these circumstances. What is it then that has incited Messieurs Berard and De Montégre to turn these facts into weapons against craniology? Why had they not the frankness to instruct their readers by what means I have been enabled to remove many of these difficulties, and how I have derived advantage from others? Ought they not to have borne me testimony, that I pursued my researches with as much candor as coolness; that I considered my subject, in all its aspects, with impartiality?

Messieurs Berard and De Montégre thus continue: "6. The arteries, the veins, and especially the sinuses form, between the cranium and brain, a sort of layer sufficiently extensive to separate the one from the other, and prevent their reciprocally moulding themselves on each other, at least in the ultimate details of organization. These vessels cause the grooves and all the impressions, which mark the internal face of

the cranium, and which have been improperly referred to the cerebral convolutions; since a more attentive examination has demonstrated that the former do not correspond to the latter. Thus, the external face of the cranium does not represent the internal in its details, and this does not represent the brain, strictly speaking. The vascular layer, interposed between the brain and the cranium, would tend, on the contrary, to act on the two parts in an inverse sense; so that an elevation on the cranium would correspond to a depression in the brain, if the external face of the osseous envelope followed the internal with more precision."*

I have never before heard of a single anatomist, who has confounded the impressions of the sanguineous vessels upon the internal surface of the cranium, with the impressions of the convolutions of the brain. The marks of the large sinuses, for instance, behind the petrous portion of the temporal bone, those at the superior part of the falciform process, &c., have never been represented by any one as the impressions of convolutions.

But, on the other hand, there never has existed either anatomist or physiologist, who has not recognised the impressions called *digital* on the superior face of the orbital plate, as well as those in the inferior anterior part of the frontal bone, those in the temporal bones, &c., for true impressions of convolutions. I have been tempted many times to believe, that Messieurs Berard and De Montégre have never had either a cranium or a brain in their hands.

"7. When," they add, "after having removed the cranium, we examine the brain covered by its membranes, we see that its surface is smooth and uniform, the dura-mater not following the sinuosities of the convolutions, which is another proof that the cranium does not in all its parts receive the impressions of the brain.

* Dictionary of Medical Science, vol. vii.

It is in fact incontestable, that the cranium does not follow the brain in these deep sinuosities; that we are obliged to remove the membrane before we discover it. The cranium then only receives the impressions of the great eminences of the brain, which are well expressed in the frontal and occipital projections, &c. But as to details, and especially such minute ones as those that cranioscopy supposes, it appears to us that the cranium cannot express them."

It is true, that, after the cranium is removed, the prominences of certain cerebral parts do not appear such as they are impressed on the cranium. Is it astonishing that the brain, so long as it is covered by its osseous box, sustained and supported on all sides, should sink down and flatten in some measure when this support is removed? But it is by no means true to say, that in this case, the great protuberances flatten entirely. Messieurs Berard and De Montégre, while making the following observation, ("It is, in fine, incontestable that the cranium does not follow the brain in these deep sinuosities, which cannot be seen but by removing the membrane,") seem to give the reader to understand, that I have maintained, that the cranium does follow it; but I have never maintained any thing like it; and this exact opposition of the cranium to the brain is entirely indifferent, as far as craniology is concerned. Have I not, on the contrary, at all times declared myself the opponent of those who admit an indefinite number of organs, and who are afraid of finding the cranium too small to contain them?

As to the "minute details that the cranium cannot express," I have to observe, that these gentlemen were present at many of my public lectures, where I established what we were enabled to astertain by the cranium; but I will hereafter return to this subject. A critic, who, in order to combat his adversary, is obliged to attribute to him opinions contrary to those which he professes, betrays the weakness of his

own arguments. "The Cranioscopists," add these gentlemen, "should follow in the brain, the organ which they believe they see in the cranium." Wisdom herself could not give better advice; but have we not followed it a long time, before MM. Berard and Montégre have given it to us? Those who have been present at our lectures, can recollect that we have repeatedly shown our auditors, in the brain, an organ which was designated on the cranium. They cannot be ignorant that at Paris, we have, in the presence of many witnesses, made researches on the brains of some men of eminent talents. But I could wish that they were ignorant of this. By what right do they suggest to their readers, the idea that men, who, during a long series of years, have devoted themselves to the study of the functions of the brain, with an indefatigable zeal and a love of truth, superior to all obstacles, have neglected to observe so necessary a condition? How many times have I repeated to them, that, after having ascertained the place of an organ on the cranium, we have followed this organ in the brain; and that we have found the forms of the cerebral convolutions corresponding to the protuberances of the surface of the cranium?

"Finally, we shall remark," conclude MM. Berard and De Montégre, "that had cranioscopy a much greater extension, than we believe ought to be allowed it, it would require a very delicate and practised tact; that there would be very few competent judges in this matter, and, at the same time, error would easily enter into all considerations on the subject."

I am convinced, that, to speak correctly of organology aud cranioscopy, it is necessary to acquire a knowledge of it by a long and practical study. But it is not less certain, that those only who have fulfilled this condition, have the right to establish themselves as judges with the public. I shall attempt now to answer the objection of the want of parallelism between the two tables of the cranium.

I have never pretended to distinguish the influence, which modifications of the forms of the cranium, slightly marked, may have on the character, or how its corresponding shades may be traced.

My first observations have only been made upon persons, who were distinguished from other men, by some eminent quality or faculty. I easily perceived that it was only in such individuals, that I could find striking differences of the head, and that I could distinguish well-marked protuberances. I had not then, in the examination of heads and crania, any other object than to discover the external marks, which indicate qualities or faculties eminently distinguished.

But, it is certain, that the want of parallelism in the two osseous tables of the cranium is not, in the state of health, or previous to old age, an obstacle which prevents the observing of the marked development of certain cerebral parts. To convince my hearers, I showed them crania sufficiently thick; for example, those represented, Plates VIII. X. XI. XII; then I directed their attention to the cerebellum, and I caused them to observe its slight development, as in Plate X. fig. 47, 48; its moderate development, as in Plate XI. fig. 47, 48; and its very great development, as in Plate VIII. fig. 47, 48. I demonstrated also the greater or less development of the posterior lobes of the brain, immediately above the cerebellum. These posterior lobes are, for instance, much less developed, Pl. XI. fig. 48, 49, and Pl. VIII. fig. 48, 49, than in Pl. X. fig. 48, 49, and Pl. IV. ii. fig. 28.

Who will venture to assert, that, with similar organs, the want of parallelism of the tables can lead to error? Generally, I demonstrated the same thing in regard to the two organs situated on the superior part of the head; that of benevolence, and that of firmness. I commonly demonstrate the same thing also with regard to the organs of architecture * and number, when

* Constructiveness.

they have acquired a marked development; but these two last are among the smallest. These demonstrations convinced all my auditors, that the want of parallelism in the two tables, when it occurs, does not in the least degree invalidate cranioscopic examination. In treating of the fundamental powers and their organs, I shall apply these considerations to each organ in particular.

For want of a sufficient number of facts, I cannot decide the question, whether, among certain races, the crania are thicker than in others. The crania of Negroes are often thick and heavy, but I have some in my collection that are thin and light. The crania of the Greenlanders and the Esquimaux, which are in the collection of M. Blumenbach, are thin and light. According to Herodotus, the crania of the Egyptians were thicker than those of the Persians. Sometimes the crania of men of very limited capacity are exceedingly thick, even when this condition is not the result of advanced age or mental disease. Similar crania are useful for physiology generally, but they are of no service in craniology. M. Hufeland fears, that by and by, we shall discover so many organs, that the cranium cannot contain them. I shall refer this question to the section on the primitive powers.

This philosopher is deceived, in affirming that I regard each convolution as a particular organ. I have never taught this; even if such were the case, it would not be impossible to recognise, on the external face of the cranium, the extraordinary development of certain convolutions. It is true that the investigation would be more difficult, if many neighbouring organs had acquired at the same time a great development. But however this may be, every individual cannot become the object of useful craniological observations.

I observe finally, that all the objections, and all the doubts of my adversaries, have a radical defect. Craniology and organology are experimental sciences.

Why do not my adversaries commence by repeating the observations that M. Spurzheim and myself have made? Why do they not collect facts, rather than oppose me by subtilties drawn from their own method of considering the powers of the mind and animal organization? I myself formerly believed in the commonly received ideas, but the power of facts has constrained me to sacrifice to truth, the knowledge which I derived from the school, and this mania of explaining every thing, for which I had contracted so strong a habit. The naturalist, above all, is the slave of nature; he ought to know what is; afterwards he can give himself up to his vain desire of knowing why, *what is, is, as it is.*

Observations on the Examination of the Heads and Crania of Animals.

In order to extend to animals, the observations which in man allow us to interpret the forms of the cranium, it is necessary to make a particular study of the structure of the heads of different species. We cannot give a general rule either for the mammalia, or for birds; nor for amphibious, frugivorous, or carnivorous animals. In certain species, age produces an essential change. Among fish, tortoises, &c., we cannot absolutely determine the form of the brain by the external configuration of the cranium.

Among certain animals the head is scarcely more covered with muscles than in man; others, except in certain regions, have the whole head furnished with strong muscles. In some species the frontal sinuses are wanting; in others the cellules, between the two osseous tables, are continued not only into the frontal sinuses, but extend through the whole cranium, even to the horns. In other species cells only exist in one part of the cranium, but these, it is true, are quite extensive. In birds the cerebellum only occu-

pies the median line of the occipital bone, its lateral parts are entirely occupied by the auditory apparatus. In some animals the cerebellum is covered by the posterior lobes of the brain; in others it is placed behind these lobes.

In nocturnal birds, the two tables of the cranium are considerably separated from each other, and the interval is filled with a very light cellular substance. In some species the osseous tables are parallel, although somewhat distant from each other; in others their direction is entirely different. In dogs we observe, both as respects the muscular mass, the frontal sinuses, and the crown (*crête*), a great difference not only in different varieties of the same species, but even between individuals. Some dogs are entirely destitute of frontal sinuses; others have them very large, as the wolf and hyena. The cat, the marten, the squirrel, the horse, the ape, are also destitute of frontal sinuses. The ox, hog, bear, elephant, &c., are provided with them.

In a word, the crania of animals require a particular study, in which we should never lose sight of the principle, that it is only that part of the crania of animals, the form of which is determined by the brain, that is important for organolgy. A collection of crania derived from animals, which have been known during their life, and which have been studied from their early life upwards, is the more instructive, as it enables the observer to judge, that the great difference found in individuals, as it respects their qualities and faculties, cannot be accounted for by accidental causes, and must be wholly owing to original organization.

Of the influence of the Brain on the Forms of the Cranium in the Decline of Life.

At the approach of old age, the whole nervous system begins to lose its plenitude, and consequently its activity. In all parts of the body the nerves shrink, the cerebral convolutions contract and flatten; plane surfaces and small hollows form on their prominences; they separate from each other; the intervals, (anfractuosities,) that they leave between them, increase; in a word, the whole brain diminishes.

Does it happen by this diminution of the brain, that a void space is formed between the brain and the internal table of the cranium? In opening the heads of very old subjects we do not perceive this. Let us see what experience teaches us.

It most frequently happens, that the crania of old men are thicker and lighter, than those of adults or young people. When I publicly announced this proposition, I was opposed by those physiologists, who are accustomed to anticipate experience by reasoning: they said that I was very bold, to maintain such absurdities before physicians and enlightened anatomists. Do not all the bones of the body (said they) diminish in advanced age? Do not all the bones become thinner? Why should the cranium be an exception?

I myself had believed as others did, and I was not a little astonished at first, to find that the contrary usually occurred. I multiplied my observations. I collected from cemeteries, museums, and charnel houses a great number of crania, the worn up jaws of which proved that they belonged to very aged subjects, and my early observations were in almost every instance confirmed.

Finally, I saw what Voigtel asserts in his *Manual of Practical Anatomy*,* "that the bones of the crania of

* Handbuch der practischen Anatomie, p. 274.

very aged people are often thick, light, and spongy." Walter himself, who has declared with so much warmth against my assertion, describes in his *Museum Anatomicum*,* the head of a man of upwards of sixty years, the bones of which had become thick, light, and of very little consistency; and the head of a woman of more than eighty years, the bones of which were thick, spongy, and so light, that the whole head only weighed fourteen ounces and a half; all the sutures were ossified. The external surface of both these heads was in a natural state. Bichat also records this case as being a common one. "The vault of the cranium acquires." says he, "a considerable thickness; we observe that this thickness, always increasing, offers an exception to the other bones, which become smaller." †

It is then certain, that there is deposited between the two tables of the cranium a certain amount of spongy, osseous matter, and that these tables gradually separate. Does the external table separate outwardly, and allow the cavity of the cranium to preserve the same capacity? or does the internal table encroach upon the cranial cavity, so as to diminish its extent?

If the external table separated outwards, the head at a very advanced age ought to become considerably more voluminous; we do not observe that this takes place. But, in conformity with the laws of organization, the internal table ought to follow the brain in its collapse; the osseous substance, as it is graddually deposited, ought to mould itself upon the brain, as in its primitive formation, at the time of the ossification of the cranium in the fœtus. In this manner the capacity of the osseous box lessens, in proportion as the brain, which it covers, occupies less space.

The examination of similar crania enables us to see distinctly, that the internal table separates inwardly,

* Ibid. Vol. ii. No. 375, p. 36.

† Tom. i. p. 58.

and there is no fact that induces us to believe, that the external table is changed from its original direction. In those places where the brain is most sensibly depressed, we often observe thick depositions of osseous matter. The occipital fossæ become less deep, and their sides less transparent; the *spina cruciata* becomes more prominent within, and more strongly marked; the petrous bones grow thicker; the fossæ for the middle lobes of the brain, contract and lose their depth; the prominences of the *sella turcica*, by the apposition of new osseous matter, become thicker and more obtuse, &c.

What M. Richerand says, is not exact, viz., "If the bones of the cranium make an exception to the general rule, and become sensibly lighter, it is because the continual movements of the brain wear them up, and destroy them on their internal surface;" and in another place he says, "the bones of the cranium become so thinned by internal wearing, that the pulsations of the brain become sensible through the hairy scalp."

When, finally, at the most advanced age, the brain falls into such a state of atrophy, that the old man sinks into idiocy, all the changes in question become much more evident. Sometimes the internal table manifests the appearance of having had patches of osseous matter confusedly deposited upon it. The places where, in adult age, the frontal sinuses are usually found, protrude inwards; the sinuses enlarge; and, finally, the superior internal table of the orbital plate separates from the inferior one. (Pl. XXXVI. fig. 4, 5.) At first the orbital plate appears only to thicken; but soon there is a hollow formed between the two tables, which is sometimes nearly an inch in height. We can demonstrate mechanically, that the cerebral mass has contracted nearly an inch from the anterior and inferior frontal part of the cranium only. (Pl. XLV.) And yet, notwithstanding all these phenomena, no one is willing to admit that the brain di-

minishes in advanced age! There are found among the ancients some passages, which prove that this diminution of the brain in old age, was not unknown to them. As I have said above, in this state of things the convolutions separate from each other. This separation might have caused M. Portal to believe, "that the convolutions are deeper in old men than in adults."

In some cases, but less numerous than the preceding, the cranium becomes thinner in old men. The internal table follows the brain inwards; but, as there is less of the spongy mass deposited between it and the external table, the outer follows the inner; in these cases, the external circumference of the head must necessarily diminish. Such crania are also much lighter than crania of equal dimensions and equal thickness in younger subjects.

Sometimes, in extreme old age, the cranium at first greatly thickens and becomes very spongy; afterwards the external table is absorbed, as well as the spongy mass underneath it; but it is never renewed. This absorption generally commences in the parietal protuberances, so that deep oval depressions are found there. In looking on the inside of the cranium we find it uniform, and, where the cranial walls are the thinnest, they appear transparent. At last other parts are equally absorbed, and the cranium, in certain places, exhibits the appearance of impressions made with the fingers in a mass of wax; in others, that of a piece of parchment puckered by rapid desiccation. In certain places, the bones have at most the thickness of a sheet of paper; in others, they are still from four to eight lines thick. (Pl. XLVI. XLVII.) We observe on the internal surface of the base of the cranium all the thickenings above described.

Let me observe here, that, in this condition of the cranium, a slight pressure is sufficient to depress it in its thinnest parts. This circumstance is important in

legal medicine. After what I have just said, we can easily conceive, that, in the decline of old age, cranioscopy can at least determine what was formerly the state of the brain; but, on account of the unequal thickness of the cranium, it cannot pronounce with accuracy on the actual condition of the brain.

Answers to some Objections against the Influence of the Brain on the Form of the Cranium in a State of Health.

Ackermann pretended, that the variations in the form of the cranium, were occasioned by the air which penetrated into the osseous cells. Ackermann is dead, and I doubt whether any one has espoused so erroneous an opinion. Besides, I have destroyed this objection in my answer to the refutation of craniology by Ackermann. M. Spurzheim has also refuted it in his *Physiognomical System.*

If I except some naturalists of the first rank, as Sœmmerring, Cuvier, &c., physiologists and naturalists generally believe, with the respectable M. Hufeland, (who, however, does not exclude the action of the brain,) that the muscles, by the tractions and pressures which they exercise upon the cranium, contribute greatly in determining the form of the head, and that consequently we may greatly deceive ourselves in considering the prominences of the head or cranium, as produced by a considerable development of certain cerebral parts.*

However specious this objection may seem at first sight, it fails altogether when submitted to a serious examination.

1. Physiologists who bestow so much importance on the action of the muscles, are divided into two

* MM. Dumeril and De Blainfille maintain the same opinion in their lectures.

sects; and the opinions of the one are in contradiction to those of the other. Some pretend that the action of the muscles produces the eminences. Others maintain that the muscles ought, by their action, to flatten or depress the places on which they act. Which sect is right? They are both wrong.

2. Before the animal or man has left the uterus, the form of the head of one fœtus differs from that of another, and the form of each head already indicates certain leading forms of some cerebral part. In the fœtus the muscles have not yet acted. Furthermore, both in animals and in our own species, the face and the muscles of the head, for a long time after birth, and even to the period of the development of the teeth, are very small in comparison with the osseous box that contains the brain, which, as we have above seen, in proportion as its different parts are developed, acts constantly on the cranium to modify its form.

3. Most of the prominences which indicate organs, are placed on regions of the head on which no muscle acts, or which are only subject to the action of very feeble ones. The little prominences of the organs at the inferior part of the forehead, the more considerable projections on the anterior superior part, and the superior part of the frontal line, those from the summit of the head to the inferior part of the occipital bone, finally, those also of the parietal bones, cannot result from the action of muscles; for, all these regions are only subject to the action of the subcutaneous muscle, which, if it is absolutely necessary to admit its action on the cranium, would manifestly tend to level and give it a uniformly round appearance in every direction. Where is the physiologist, who would attribute to the action of muscles, the great prominences on the superior part of the forehead, where there are some important organs? the prominences on the summit of the head, of the parietal bones, of the posterior lobes of the brain, or of the superior part of the occipital bone, or the straight crests which are found

on the heads of many animals? If there were muscles attached to these prominences, as for example, to the osseous crests in some animals, these muscles could never produce an action from below upwards; they should, on the contrary, draw the osseous prominence from above downwards, or still more, backwards. So the great prominence at the superior part of the occipital bone, which corresponds to the organ of love of offspring in woman, ought not to be drawn backwards, but from above downwards.

4. In the region where the masticating muscles are attached, many very prominent and strongly defined organs are presented. M. Hufeland thinks, that, in many instances, these prominences can only prove that the individual, to whom they belong, is endowed with a strong power of mastication. Shall we always reason thus, or shall we observe facts! M. Hufeland is not ignorant, I believe, that generally we attribute to Negroes much stronger masticating muscles than to Europeans; well! Negroes have this region flattened. Have not other physiologists failed to mention that this flattening arose from the action of the masticatory muscles, so energetic in Negroes? Many animals, endowed with remarkably strong masticating muscles, such, for example, as the hyena, the bull-dog, the lion, the tiger, have not, by many degrees, this region of the cranium so much developed as some men, as many species of monkeys, as the little seal, the otter, the eagle, and even the wren; however, these last animals have extremely feeble muscles in the region of the cranium in question. And how can it be explained, that these prominences have so different a degree of development in men of nearly equal muscular power? How happens it that, in many heads which are in my collection, and which were taken from strongly muscular men, the organs are much less developed than in some other heads, which belonged to women of a delicate constitution?

5. If the prominences of the cranium were owing

to the action of the muscles, they ought to assume the contours of the attachment of these muscles; but none of the prominences, which I regard as the indices of an organ, are in this condition. All correspond to the form of the cerebral convolutions, which constitute the organ of which these prominences are the sign. I shall prove this hereafter, in treating of each organ in particular.

6. If the muscles drew the bones of the cranium outwards, they ought necessarily to act with more force upon the external table, and separate it from the internal. But it is exactly there, where the strongest muscles act, (for example in the temporal region, and in that of the occipital fossæ,) that the osseous plates are more closely in contact, that the cranium either juts out, or retreats. There, on the contrary, where the weakest muscles act, the laminæ are more separated, and it is never the external table which is moved outwards; it is, on the contrary, the internal one which is pressed inwards. This, for instance, is visible in the anterior inferior part of the frontal bone, in the middle of the *spina cruciata* of the occipital; and, as we have observed it, this separation is the more considerable as the individual is more advanced in years, where the muscles have acted for a very long time. In nature, therefore, we always observe the contrary of that, which, according to the objection, should be the result of the action of the muscles.

7. Some physiologists pretend, that the action of the muscles causes the depression of their points of attachment. Others attribute to them the prominences and the apophyses, for example, in the different bony processes, &c. In fact the muscles are attached sometimes in hollows or grooves, sometimes to prominences and crests; and it is precisely this, that proves that neither prominences nor depressions are formed by muscles; but that both are in consequence of the primitive form of the bones. In fact, who could attri-

bute the osseous crest, situated on the most projecting part of the cranium of certain animals, the occipital crest of the horse, the ox, the stag, &c., to muscles which act in quite a contrary direction? Will any one attribute to the action of muscles, the mastoid process situated behind the ear? But then, how can any one explain the other processes, whose direction is diametrically opposed to that, in which the muscles act; for example, the prominences of the occipital bone, which project from before backwards; the strongly developed osseous drum, which most of the mammalia have near the cavity of the tympanum? And why is it that the mastoid processes are often so strongly marked in very feeble men, and very little developed in those of an athletic constitution?

8. In tortoises, the strong masticatory muscles are placed in the internal cavities of the head; so also in all animals certain muscles are placed in the interior of the orbits: but have these cavities ever been seen contracted, enlarged, or modified in any manner by these muscles?

9. In certain diseases the action of the muscles curves the spine of the back: in most of these cases the right shoulder rises above the left in consequence of this action; here, say they, is a modification of bones produced by the muscles. The instance cited shows that when the action of certain muscles becomes predominant, their more feeble antagonists yield, but by no means proves that the form of the bones is modified by such an action, and that it can produce depressions, plane surfaces, and the prominences of the cranium.

M. Blumenbach cites the cranium of an old man, the left side of whose face had been so much contracted in consequence of *tic doloreux*, with which he was for many years afflicted, that it contrasted singularly with the right side. The violent cramp, says M. Blumenbach, has depressed the zygomatic arch of the affected side, as much as it has elevated the neigh-

bouring part of the lower jaw, and it has separated outwardly the zygomatic apophyses.

But, 1. This example is taken from a pathological case. There had existed here, during many years, a diseased condition of the parts. 2. M. Blumenbach makes no mention of the changes which the cranium had undergone. 3. It is more than probable that, in this long continued disease, the nerves of the face being in a state of atrophy have induced also an atrophy of the parts in which they are situated, which has produced a general wasting of these last, by which they are drawn together; but, finally, how were the muscles enabled to separate outwardly the zygomatic apophyses? What I have just said will be sufficient, I believe, to enable anatomists and physiologists to adopt more sound ideas on the actions of the muscles, and on the prominences of the cranium, and induce them to renounce the objection, which they derive from muscular action, against the utility of inspecting the forms of the head, in order to judge of the greater or less development of particular cerebral parts.

Hufeland believes that the prominences, which may arise in the cranium from accidental causes, such as blows; from gouty and syphilitic matters, &c., furnish a further objection against craniology, and that the cranioscopist can easily mistake an accidental exostosis, for the indication of an organ strongly developed.

In a similar case the cranioscopist would be liable to mistake; but that would by no means prove that in a state of health the organs, which have assumed a marked development, could not be exhibited on the cranium by determinate prominences. For the rest, the accidental exostoses, of which Hufeland speaks, disappear at the end of a certain time; they do not correspond on the two sides, and have not the form of the convolutions of the brain.

If, after all, Hufeland wishes only to prove, that one can be mistaken in cranioscopy, and if besides he admits craniology, I am far from contradicting him,

Errors are very possible, especially in those cases where persons, who have not the requisite knowledge and experience, undertake to examine heads. But where is the art or science in which error is impossible? Do not even mathematicians commit mistakes?

Platner of Leipsic rejects all the organs that I have discovered on the median line; for, says he, the longitudinal sinus exists in the whole length of this region, and it does not correspond to any cerebral part. (Pl. IX. fig. 48, 69.)

It is true, that immediately under the cranium, the falciform duplicature of the dura-mater separates into its two laminæ, and is attached to the superior borders of the parietal bones, and that it forms there a groove or sinus, but this sinus has hardly the diameter of a large sized quill. This space is much too narrow to prevent the median line of the cranium from forming projections externally, in those places where very strongly developed convolutions exist; and, consequently, to conceal the considerable development of these parts. In the occipital region, and often in the frontal region, the hemispheres separate more or less from each other. (Pl. IV. fig. 25, 28.) In this case the middle part of the *spina cruciata*, and of the inferior part of the frontal bone, descend deeper into this separation of the two hemispheres; the prominence of the cranium too, formed in the occipital part by the two posterior lobes, is double in this case, whilst it is single when the hemispheres are only slightly separated. (Pl. VIII. fig. 48; Pl. IX. fig. 48, 69; Pl. XIII. fig. 48, 69.)

Finally, it may be asked, if it is possible to discover the functions of all the organs. I shall examine this question in detail, when I come to speak of the means of determining the seat of the organs. Perhaps the surface of the cranium is not sufficient to enable us to decide on this point; for, there are convolutions which do not touch its internal surface. The most concealed of all, and which have escaped thus far the

eye of the anatomist, are those which cover the *corpora striata* on their external surface. (Pl. v. fig. 42; Pl. XIII. fig. 68.

All the convolutions situated on the two internal faces of the hemispheres, which receive between them the falciform duplicature, and by means of which they touch each other, present fewer difficulties. (See Plate XI., which represents a vertical section of the brain, between the two hemispheres.)

In attentively examining these convolutions, we remark, that they are all prolonged, more or less vertically, to the surface, and that thus they are found in contact with the internal surface of the cranium, through the medium of the membranes.

We have constantly observed, that these internal convolutions have the same size with those placed on the surface; the former are then but a continuation of the latter, and probably constitute a part of the same organs. Generally, in all the convolutions, we can only judge of those portions of them which appear at the surface; the rest are concealed in the anfractuosities. Neither does the cerebellum touch the cranium in the whole of its extent; yet notwithstanding this we judge of the degree of its developments, and this without ever deceiving ourselves, by the greater or lesser protuberance which the occipital fossæ externally present.

The part of the brain situated at its base, quite near the median line (Pl. III. fig. 26, 70; Pl. IV. fig. 70), is the only part that absolutely escapes the observer, in his examination of the cranium. The degree of development of all the other convolutions, is manifested either in the temporal region, or by the form of the orbits, or by the position of the eyes.

I will further add some observations by M. Démangeon,* on the influence of the brain in the form of the cranium.

* Analytical and Critical Picture of the Work of Dr. Gall. Paris. 1822.

"Those who have not reflected on the economical operations of nature, wherein the parts, the least essential for her purpose, are always kept in subordination to the influence of the most important ones, represent her as acting according to ideas which the grossest mechanism has suggested to them, where the employment of the most gross external agents cause the less resisting to yield. Forgetting that a drop of water in time hollows out a very hard stone, less by its consistence, than by the continuity of repeated dropping, they cannot conceive, that the continual action of nature in nutrition, changes and modifies the hardest as easily as the softest parts, by the successive apposition of nutritive elements, and the re-absorption of those that have remained a long while in the system. For this reason they would have us believe, that the brain obeys the inert resistance of the cranium, because this last is the hardest, in spite of the evidence to the contrary, in hydrocephalic subjects. It is then by an inconsistency which puts them in contradiction with themselves, that they recognise the dilatation of the cranium by the action of water in hydrocephalic subjects, and the sinuosities of the sanguineous vessels on the osseous surfaces.

"It is also with the same inconsistency, that they admit the action of the muscles as the cause of the production of the prominences of the cranium, although they are softer than the cranium; besides, that, observation proves that the protuberances are either out of the sphere of muscular activity, or in no sort of proportion to it. However, they not only see the brain and the soft parts, but also the cranium and all the bones gradually increase with age, notwithstanding the previously acquired dimensions and consistence of these last. They see also the shell of the snail, the shield of the tortoise, &c., progressively increase with the animal which they enclose, and assume protuberances without the assistance of any muscular traction exercised upon their texture externally. This takes place

for no other reason, than, because the shell and the testaceous covering are rather made for the animal, than he for them; and it is also reasonable to believe that the brain, being an object more essential to the end of nature than its osseous envelope, this last ought to yield to the developments of the former, as every thing demonstrates that it does. Nature then is less embarrassed by the consistence of the hard parts, in her attempts to develope those that are softer, than some would have us believe. It is by dreams of fancy, that the domain of the sciences is incumbered, and we must scatter them in order to penetrate therein and extend its bounds. It is a general axiom in natural philosophy and physiology, that it is not from the greater or less consistence of parts, but from their greater or less energetic or continued action, that those changes that are effected in nature depend. But, as of all animal parts the bones and scales are the most inert, they have the least power also, to modify and influence the other parts in their forms and developments."

Of the Influence of the Brain on the Form and Texture of the Cranium in a State of Disease.

The Influence of the Brain on the Cranium in Cases of originally defective Conformation of the Brain.

Other bones, it is said, grow independently of the brain, and receive their determinate form according to the laws of organization; why does not the cranium too, grow and receive its different forms Independently of the brain? This supposition is founded not only in analogy, but it is further confirmed by the existence of crania absolutely devoid of brains.

Crania without brains! I have proved already, that such do not exist. Let us refer to what I have established in my large work.

I have cited Duverney and Tauffer, who found in two heads of new-born infants water only, and no cerebral substance. I have thought that these heads belonged to the class of those observed by Morgagni, Bonnet, Vesalius, Tulpius, &c., where the brain, dilated or unfolded into a fine membrane, might have deceived Duverney and Tauffer.

But since my large work was published, I have myself had occasion to examine the hydrocephalic head of an infant born dead. Being more voluminous than the generality of heads of new-born infants are, it was delivered with difficulty, by the forceps, but without perforation, by M. Delpech. The superior, posterior, and lateral fontanelles were very large, and the fluctuation of a considerable mass of liquid was distinctly perceived. M. Hervez opened it with the greatest precaution in presence of MM. Delpech, Bousquet, and myself. After the incision of the cartilaginous membrane and the dura-mater, there escaped as great a quantity of water as the cavity of the cranium could contain. It was impossible for us to discover, on the whole internal surface of the cranium, the least trace of an arachnoid membrane, of the pia-mater, of a vascular membrane, or of cerebral substance, or, even the least mucosity on the internal surface of the dura-mater.

All the bones of the head, which I have preserved in my collection, were perfectly developed, and presented their natural forms; only the orbital plates were depressed, as usually occurs in hydrocephalic cases of any extent. This fact refutes then my first assertion, and it proves that the bones of the cranium may take their natural forms, independently of the action of the brain against their internal surface.

I will relate two analogous facts reported by M. Breschet, Chief of the Anatomical Department of the Faculty of Medicine, &c.

First Observation.

"A few days since, there was left at the Foundling Hospital, a male infant, which appeared to be ten or twelve days old; for, the umbilical cord had fallen off, and the umbilicus was completely cicatrized.

"This child lived nearly two days in the hospital, and during its continuance there, it manifested great weakness, had a laborious respiration, and some convulsive motions. The form and volume of the head exhibited nothing extraordinary, which could enable any one to suspect the existing disposition of the organs enclosed within the cranium; only the bones of the cranium were movable in the sutures.

"When the cavity of the cranium and the membranes of the brain were opened, there flowed out a considerable quantity of a clear, limpid serosity, resembling distilled water, in quantity from twelve to fifteen ounces. This watery fluid was contained within the cavity of the arachnoid membrane. The dura-mater appeared in its natural state, but the arachnoid membrane and the pia-mater were thickened and firmer than usual, and of a very vascular appearance. The brain and the cerebral peduncles (anterior prolongations) did not exist. In front of the annular protuberance, or middle brain, nothing was seen but a small quantity of a soft, greyish substance, with inequalities on its anterior part; this substance, at most, occupied an extent of from eight to ten lines from side to side, and from before, backwards.

"The cerebellum was covered by the duplicature of the dura-mater, which forms the tentorium. Its right lobe was but half the size of the left. The annular protuberance, the bulb, and the spinal cord were in their natural condition.

"The nerves being carefully laid bare, we distinctly

saw* the first pair, or olfactory nerves, the anterior protuberance of which was strongly marked; we saw also, two white filaments, which were directed backwards towards the spinal marrow; still, we were not able to follow these cords either to their origin or their insertion.

"The optic nerves, being exposed from the globe of the eye to the cavity of the cranium, exhibited in the orbit their ordinary size, but beyond the optic holes, their calibre diminished. Their point of union seemed less formed by the mingling of their common substance or their decussation, than by a transverse commissure of two or three lines in extent. These two cords then continued on, diverging, and terminated in the anterior part of the protuberance, towards the two anterior eminences of the *nates* and *testes*.

"The third pair was followed in all its branches, as well as the fourth and sixth. As to the fifth, its origin could easily be seen. Forming at first a single cord, it passed upon the anterior face of the petrous portion of the temporal bone to divide as usual into three branches. We followed the first or opthalmic of Willis into the orbit and on the frontal region.

"Finally, the auditory nerve, the pneumo-gastrics, the glosso-pharyngeal, and the great hypoglossus, presented nothing unusual. The same was the case with the spinal nerves."

Another fact of the same kind has been furnished me by M. Beclard. I will give an abridged history of it.

Second Observation.

"A fœtus was born at the full term, at the hospital of the School of Medicine, having its head a little larger than usual. The accouchement was natural, but rather long. The child lived five days.

* I say, we saw, because this examination was made by my associate Baron and myself in presence of MM. Veron and Lelut, students in the Foundling Hospital.

"The head being opened, the cranium was found filled with a lemon-colored water, a little viscid. The spinal marrow, the cerebellum, the pons Varolii existed. The medulla oblongata was divided in front, and exhibited the peduncles of the brain terminated by eminences, which appeared to be the optic thalami and the corpora striata. Besides this, the medulla was prolonged between the peduncles in two small white cords, which terminated in the ethmoidal grooves by the expansions of the olfactory nerves.

"This curious observation differs from the preceding one in this, that, in the second case, the cerebral peduncles existed and appeared to terminate in front with the eminences, which M. Beclard thought were the corpora striata, and the pretended beds of the optic nerves. Nothing similar was seen in the first case.

"If, from a small number of facts, we could come to general considerations, I should say these observations tended to prove, that congenital hydrocephalus depends rather upon some defect in the development of some of the cerebral parts, than upon an alteration, or in the destruction of this organ by the liquid.

"That, from these observations, it is reasonable to presume that the evolution of the brain had not taken place, that is to say, that its development had been arrested.

"That existence, or life in atmospheric air, is possible for a few days, without a brain.

"That the brain does not give rise to any nerve, and that, as far as the nervous system is concerned, we may consider it as being rather a ganglion for communicating nervous influence, than as the source of any nervous cords.

"That the olfactory nerves, existing in infants in whom the brain is wanting, do not derive their origin from this portion of the cerebral mass, unless we admit, that all the parts arise independently of each other, in the situations, where they are found.

"The size of the olfactory nerves in new-born children, which is always considerable, their club-like figure, the nature of their substance, the filaments coming off from the inferior surface of their bulb; finally, their existence in the children which I have described, lead us to believe, that those parts which are called the olfactory nerves, are not so much nerves, properly so called, as little lobes or prolongations of the spinal cord, analagous to the brain itself.

"If we consider them as nerves, we must admit, that the cerebral lobes or the corpora striata, are not the places of their origin, but that they derive it from a point farther distant.

"Do we not find in many fishes a disposition of parts which supports what I have advanced; and is there not a striking analogy between the conformation of the ethmoidal nerves of these animals, and those of the fœtus without a brain?

"In relation to the development of these prolongations, we may say, that the analogy of conformation is as much more strongly marked between man and these animals, as we examine the former at periods nearer his earliest formation, that is to say, during his fœtal life.

"Finally, from the observation of M. Beclard and myself, we are authorized in believing that the normal development of the containing parts, is not in dependence on the existence and the regular growth of the contained parts. The cranium may present a regular form, although the brain is wanting, or, if it has experienced a greater or less deviation in its evolution."

I perfectly agree with M. Breschet, when he presumes, that in these cases, the brain has been arrested in its development, and not destroyed or dissolved by a liquid. We have already proved this truth, in our Memoir presented to the Institute of France, the 14th of March, 1808, followed by observations on the report which was made on it, by the commission to which it was referred.

We have also proved, in many places, that the brain, properly speaking, does not give origin to a single nerve. But it would be wrong to consider the brain as being rather a centre for the nerves, than as the source of any nervous cords. The brain contains many masses of a grayish or gelatinous substance; for example, in the medulla oblongata, in the annular protuberance, in the optic thalami, so called, in the corpora striata, and in the whole surface of the convolutions which furnish new nervous filaments to those, which were already furnished by this same substance anteriorly; and these are the ganglia of supply (*renforcement*) of the white fibrous substance of the brain and the cerebellum.

As to the olfactory nerve, we have exhibited in our first volume, (Quarto, page 117; Folio, page 84,) the opinions that are held on it, and we have proved that it has no connexion with the corpora striata, which serve solely as ganglia of supply (*renfort*) to the brain.

Let us return to those cases which most frequently occur. When there is no brain, sometimes all the parts situated above the neck, the chest, the umbilicus, &c., are wanting also.

When the nerves of the senses only exist, some only of the cerebral parts, placed at the base of the cranium, are developed, that is to say, those from which these nerves are derived. In these cases the base of the cranium is but imperfectly developed, and gradually and in the same proportion as more cerebral parts exist, there is also a further development of some of the inferior and lateral parts of the cranium. These are called acephalous monsters, because neither brain nor cranium is distinguished above the eyes. PLATE XVIII. represents such a case, (fig. 3.) We see there the optic, the olfactory, and the auditory nerves. The anterior inferior part of the frontal bone, which goes to form the orbits, the temporal bones, a small portion of the parietal bones, and of the occiptal, &c., are but just commenced; in the

unfinished parts a great opening is left, *B*. I have proved, vol. I. p. 52, 4to., that simular monstrosities are not born so in consequence of cerebral dropsy, but that the fœtal defect is absolutely original. PLATE XIX. fig. 11, represents a vicious conformation of the brain. In this head, all the posterior inferior part of the occiptal bone is wanting; in consequence of this, a great opening remains in the posterior part. For some time a commencing portion of brain existed there. From this cause the middle portion of the parietal bone is a little swollen; but afterwards the brain escaped by the posterior opening, and the bones of the cranium, not continuing to arch, have remained flattened on the remnant of the brain. The subject in question is of the number of monsters which have, on the back of the neck, a membranous sac containing a very imperfectly developed brain. Similar vicious conformations evidently prove, how much the form of the cranium depends upon the form of the brain, and that the bones of the cranium are very rarely formed by laws independent of the brain.*

In these cases, where the brain has acquired but a very imperfect development, the cranium remains small in the same proportion. PLATE XVIII. fig. 11, represents the contour of the brain of an idiot from birth. This is from Willis. In fig. 1, the cranium of a child seven years of age, an idiot from birth. PLATE XIX, fig. 1, the head of a man twenty-six years of age, an idiot from birth. Mr. Bonn, Professor at Amsterdam, possesses the cranium and brain. PLATE XX. fig. 1, the head of a girl, twenty-two years of age, imbecile from birth; fig. 11, the cranium of the same. I have before spoken of these heads, and of many other similar ones which I have in my collection.

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* M. Geoffray St. Hilaire has given drawings of these three acephalous monsters in his excellent memoir on many of the malformations of the human cranium, read before the Academy of Sciences, 1820.

When the cerebral parts increase in volume, the original imbecility is less complete in the same proportion, and the cranium, although still imperfect, acquires also more development. PLATE XXVI. exhibits the cranium of a boy of fifteen, who, on account of the great development of the organ of property (acquisitiveness) and a defective conformation of the frontal parts, XXI. 53, 54, 55, 56, had an irresistible propensity to rob. PLATE XXIX. represents the cranium of an old woman partially imbecile from birth. Let any one now compare these defective crania of persons, who only enjoyed qualities and faculties as defective as their brain indicates, with the beautiful cranium which encloses the well developed brain of the man of talents. (Pl. XXX. and with Pl. XXXIX. and Pl. LVI.)

The Influence of the Brain on the Form of the Cranium in Hydrocephalus.

When, in consequence of a collection of water, which takes place in the cavities of the hemispheres, the cerebral convolutions are unfolded and distended, the cranium contracts a faulty conformation, which is precisely the inverse of that of too small crania. In this case the unfolded brain distends the bones of the cranium, whether they are yet united by their sutures or not. In the early periods of this distention, we perceive exposed between the edges of all the cranial bones, or sometimes between some of them only, the cartilaginous membrane, which is visible over a large space at the place of the fontanelles.

In infants, that are born hydrocephalic, the head is compressible, that is to say, by the aid of compression, we can cause the bones of the cranium to approach each other. This circumstance is very important in legal medicine; since, in a similar case, we

should not, if the child dies during delivery, attribute its death to the mother. From the age of a few months up to ten or twelve years, effusions of water frequently take place in the cavities of the brain, in consequence of neglected cerebral inflammations, of a too rapid development of the brain, of falls or blows upon the head, and also in consequence of frequent masturbation. When such patients have, by degrees, lost their sight, and the pupil remains motionless and insensible to light, being constantly dilated; when they vomit frequently, &c., I have sometimes found the bones of the cranium already more or less separated, even sometimes to the distance of from three to six lines. Cases are recorded, where persons, even of more than thirty years of age have had effusions in the cerebral cavities, and where the bones of the cranium have been considerably separated in a very little time.

If the effusions are of such a nature as not to lead to the death of the individual, a great number of osseous points is formed in the cartilaginous membrane whence the little bones arise, which reunite anew the bones of the cranium *orselets vormiens.* (Pl. XXI.)

In most cases, when the fluid collects slowly in the cerebral cavities, the osseous radii become solid, and have a tendency to elongate as the distension increases, and to keep the cranium closed on all sides, without any particular points of ossification being formed. The cranium of a child seven years of age, completely imbecile, and almost entirely stupid, represented in Plate XXIII. is of this kind. We only perceive the cartilaginous membrane in a few places; the superior orbital plates are so entirely depressed from above, downwards and forwards, that the eyes of this child are very low and projecting. PLATE XXIV. represents the same case seen in front.

The following passage, extracted from Blumenbach, proves still better, with what force the internal parts

of the head act on the bones of the cranium. "In internal hydrocephalus," says this author, "the parts of which the temporal bone is originally composed, preserve, in fact, their primitive dimensions, but they are sometimes separated by the distension of the cerebral membranes, so that the small bones of the ear lose their natural situation and are put out of joint. I have seen very frequently in hydrocephalic patients, where the temporal bone had undergone this deformity, the *malleus*, the *incus*, and the *squamous* portion carried from below upwards with the temporal bones, and the *incus* absolutely separated from the *stapes;* once, I have even seen the *stapes* torn from the *fenestra ovalis*. This will explain why some hydrocephalic adults are deaf and stupid at the same time, while others preserve their hearing perfectly."

PLATE XLIX. represents the superior part of a hydrocephalic head of an infant of four months. As in this case the effusion had progressed rapidly, the whole head represents a parchment pouch. Here and there are seen some ossified parts; in general, there are observed, alternately, points and radii of ossification, and the cartilaginous membrane. The whole cranium had the flexibility of parchment. Generally the crania of hydrocephalic patients, even at the age of fifty and sixty years, are very thin, although completely ossified.

Ackermann and M. Fodéré, in their observations on the heads of cretins, remark certain peculiarities as always existing, but which, probably, they have only observed in a small number of subjects. I have observed a great number of cretins; I will not stop here to describe their whole constitution, I will speak only of their heads. The head is either incompletely developed or hydrocephalic. PLATE XXI. represents in profile a similar case of hydrocephalus of the common species. PLATE XXII. represents the same, seen from above. The water has acted there in all directions, but principally in that of the occiput.

The orbital plate is also strongly depressed; there does not exist on its internal surface any digital impression; which proves that the convolutions which rested upon it, originally projecting but little, were already entirely unfolded.

I would remark by the way, that, in the greater number of these hydrocephalic patients, we find the hairy scalp covered with a furfuraceous efflorescence.

There exists a great variety of these malformations of the head, which probably are most frequently owing to effusions.

PLATE XXXI. represents a similar head in front; the frontal suture is not united; the regions IX. IX. d. c. are far from being symmetrical; the orbits are superficial. PLATE XXXII. shows the same cranium in profile; we see that the diameter of XXI. in 11, is much smaller than the distance from one temporal bone to the other. The extraordinary long head, Pl. LIV., exhibits quite an opposite character. I know nothing of the particulars of the lives of those individuals, from which these two crania were taken.

As some preserve their mental faculties in spite of a very considerable hydrocephalus, so also we find, sometimes, the most singular forms of head among those individuals, who enjoy their faculties in all their strength. But we must not forget here, what I have said, in volume second, of the dispositions peculiar to mental diseases. Those heads which, in consequence of an extraordinary but not diseased development of certain organs, have assumed an uncommon form, are absolutely an exception to that, which is applicable to the predispositions to mental diseases.

Influence of the Brain upon the Cranium in Mental Diseases.

Mental alienations are diseases of the brain. Happily, in our days, Democritus would only find his Abderites among certain metaphysicians. If any one wishes to combat opinions fraught with the most dangerous consequences, let him oppose those which condemn to a cruel neglect and imprisonment in infected cells, those unfortunate victims, who always merit our compassion, and often our esteem. We hardly dare to fix our attention on the establishments for the insane; so defective are they in most countries, that they appear the shameful monuments of the most profound ignorance.

I soon perceived, that my researches would throw great light on more than one point connected with mental diseases. How could physicians, who had not the least idea of the functions of the brain in health, have just ideas of mental diseases? I employed myself, therefore, to open as many crania of insane persons as I could procure. I have already proved, in Vol. II. p. 206, that we find in the brain and its membranes, and even in the cranium, various sensible alterations. I shall now communicate to my readers, what I have ascertained relative to the cranium alone, and what Spurzheim and myself have constantly found confirmed.

When the alienation has been of short duration, the cranium often does not offer the least trace of diseased alteration, unless the disease has been developed insensibly, and in such a manner as not to show itself, until after a long period. Very frequently, we mistake the first phenomena of madness; we attribute to caprice, to carelessness, to vice, to a change in the moral character, what, in fact, is only the early manifestation of cerebral disease. But, when the disease of the brain is chronic, the same phenomena are manifested in the brain, that we observe in nerves that

have been diseased for a long time. After a long continued disease of the sciatic nerve, it gradually wastes away, and all the parts, to which it gave sensation, partake of this wasting. The same thing happens to the brain, when its vital forces have been injured for a long period. It wastes; its convolutions become narrower and lose their turgescence; the whole brain shrinks; and here, as in advanced age, the internal table of the cranium follows the sinking in of the brain. The bones of the cranium thicken, but they do not become, as in old age, more spongy and lighter, but, on the contrary, more dense, compact, and heavier, approaching the nature of ivory. (Pl. XXXVI.)

Many physicians have remarked this circumstance, but, far from regarding it as the consequence of a cerebral disease, they consider it as its cause. They have considered that the cranium, in consequence of its thickness, compressed the brain, and disturbed the exercise of the mental functions. Even in our days, Dumas, Bailey, Sir Everard Home, and others are of this opinion. If such were the case, mental diseases would only arise very slowly, and we should hardly be able to conceive how, by the aid of rational treatment, so many maniacs have been cured, and often in so short a time.

I am not the first, that has observed this thickening and this ebony hardness of the cranium; still physiologists and physicians have generally paid so little attention to it, that when I spoke of it, all contradicted me. In vain did I cite to the support of my observations those of Greding, whose writings were unknown to me for a long time after I had commenced publicly teaching my discoveries. This physician, in two hundred and sixteen bodies of maniacs that he opened, found a hundred and sixty-seven crania very thick, without speaking of those which in reality were not thick, but very dense. In a hundred violent maniacs he found seventy-eight crania very thick; in thirty crania of idiots, he found twenty-two very thick.

These exact observations were not sufficient to awaken the incredulous from their lethargy. Walter of Berlin remarks on this subject, "My whole life has been consecrated to the study of animal bodies, and human bodies in particular. I have examined the brains of the insane of every species, but never have found their crania thicker than in ordinary cases, as Doctor Gall maintains." Rudolphi, entirely occupied in maintaining his own opinion, passes over in silence the great number of thickened crania of maniacs that Greding has found, and insists on the small number of thin ones, of which Greding also speaks. As to my observations, he says, that my opinion is founded on a single cranium that I possess. However, when I had the honor to receive a visit from Rudolphi at Vienna, I exhibited to him a sufficiently large number of thick crania of maniacs that I possessed. In France Greding is reproached as having understood nothing of the anatomy of the brain, and the general opinion is based on that of M. Pinel, who only mentions one single cranium, which was very thick.

M. Esquirol also pretends to have made observations, which prove the contrary of that which I have advanced. Notwithstanding this, we found, in the far greater part of the heads that were sent us from the Bicêtre and the Salpêtrière, crania so thick or dense, that M. Spurzheim was able to tell whether the head, which he was engaged in opening, came from one of these two hospitals, or some other hospital, from the force which it opposed to the saw or hammer. Finally, M. Esquirol himself cites a great number of crania of insane people, which had become very dense and thick, or, what was more general, only very dense.

Probably this observation would have been less contradicted in France, if it had been recollected, as I afterwards learnt, that Bichat had made the same observations on the heads of maniacs. M. Curt Sprengel says also, that, in opening the bodies of the melancholic, he often found the cranium of more than usual

thickness. It is impossible that physicians, who are engaged in the opening of dead bodies, can, for a much longer time, contest this truth, unless, by a procedure unworthy of scientific men, they should desire to sacrifice a manifest fact to personal considerations.

When the insane become very aged, they feel the influence of years, and their cranium becomes thinner, as that of other old persons.

I do not wish to exclude the cases, where, by a general disease of the osseous system, by rickets, by an herpetic diathesis, by *horrigo*, (scald-head,) &c., all the bones may be found in an unnatural state, for example, become thicker, a change in which, perhaps, the brain has no part. We have seen, in the collection of the Elector Maximilian, a cranium, the bones of which were certainly an inch in thickness; but the bones of the jaws were proportionally thick, which does not occur in the bones of maniacs. It remains for us to examine, if a similar disease of the bones exists independently of a total derangement of the nervous system.

The changes of the bones of the cranium, which are simply the consequence of a cerebral disease, afford us the certainty, that the brain is the immediate seat of the disease; and that it is not necessary to search for the causes of these diseases either in the mind, or in a pretended perversion of the imagination, but in the material instruments.

These same changes teach us also, why these cerebral diseases resist curative measures so much the more, as they become more inveterate. The cure ought to be much easier so long as organic derangement does not exist; it would be more difficult, and often impossible, when shrinking and atrophy of the two cerebral substances, thickening of the membranes, ossification of the vessels, and thickening of the cranium have already taken place. Finally, these successive changes enable us to conceive, how mental diseases degenerate eventually into incurable mad-

ness. The cases where insanity, consequent upon a long disease, has yielded to treatment, are extremely rare; and this amelioration of the mental condition leads almost always to a violent paroxysm, during which an irritation, as sudden as it is excessive, produces a lucid interval rather than a cure.

A similar state is observed in idiots after wounds of the head. The moments of exaltation, which the dying sometimes have, may be attributed to the same cause.

The Influence of the Brain on the Cranium, in those Cases, where certain Cerebral Parts are more diseased than others.

It often happens, that the head is more prominent on one side of the forehead or the occiput, than on the other. When this want of symmetry does not arise from the situation, in which the heads of such persons had been placed from early infancy, they are generally, in the early years of their life, in very feeble health, or subject to nervous convulsions. In such cases we may always suppose, that a watery effusion exists in the prominent side. In adult age the health is often reëstablished, but the partial distention of the cranium continues; and the patients, in process of time, perceive the motion of water. They say that they have the sensation of a cold ball, which moves in their head, sometimes forward, sometimes backward. They are subject to head-aches, especially at the approach of a tempest or a storm. I have already spoken of two crania, one of which had become very dense and thick at the anterior part of the frontal bone, because the part of the brain, situated against this region of bone, had suffered from a neglected inflammation, the consequences of which had caused the death of the individual. The second of these crania had become very dense and thick in the region of the occiput,

in consequence of a large excresence in the *tentorium* of the *cerebellum*, which had compressed the posterior lobes of the hemispheres. In the cranium of the æronaut Blanchard, the right side was thicker than the left; the orbital plate of this side was more prominent, the internal cavity was smaller, all the anterior part was more protuberant; and this, because there had been a greater collection of water in this side than the other. In a decrepid old woman we found the cerebellum hardly as large as in a new-born infant. The brain itself had not diminished in the same proportion, consequently the cranium was very thick at the inferior occipital region only. The occipital fossæ were extremely small, and hardly transparent in a space of from two to three lines. The petrous bones, in their posterior part, were half as thick again as in their natural condition.

In the cranium of a man, who had received a sabre wound in one of the occipital fossæ, in consequence of which the cerebellum had been in a state of suppuration for several weeks, the occipital fossa of the same side is much smaller, and the bone is much thicker than in the other side. In the head of a young woman that was sent to us from the Salpêtrière, and of which I have before spoken, we found the left hemisphere much smaller than the right; this arose from a large ulcer in the middle of the optic couch, so called, of the left side. This optic couch, or rather this cerebral ganglion, had diminished more than half; the corpus striatum of the same side, and all the left hemisphere, had undergone the same diminution. PLATE LI. fig. 1, represents the sound hemisphere entire; fig. 2, the sound optic couch; fig. 3, the sound corpus striatum; fig. 4, the two anterior lobes seen from below with the two optic nerves. PLATE LII. represents the two hemispheres, but the left hemisphere alone is entirely visible; the right hemisphere extends beyond it, and we observe how much smaller the convolutions are. Fig. 2, is the optic couch

shrunken by suppuration and atrophy; fig. 3, the corpus striatum also in a state of atrophy. As to the cranium, Plate LIII. the whole of the left side is thicker than the right, particularly from the temporal to the sphenoidal bone; the left orbital plate is spherical and uniform, whilst we observe distinctly in the right orbital plate, which is much less convex, the impressions of the convolutions. The fossa between the orbits and the petrous bones, is much smaller than that of the opposite side; thick depots of osseous matter are seen on the internal inferior part, and on the internal lateral part, of the temporal bone, the petrous portion thicker, the occipital fossa smaller; in the cranium also, is seen the same shrinking as in the left hemisphere of the brain.* Later, I received a head, in which the right hemisphere was still more diminished, than in the preceding case. I have preserved a cast of it. In the cranium we observe on the right side, the same thickening and the same proportional contractions, that we observe in the preceding case on the left side. In both of these crania the temporal bones, so transparent in the natural state, are three lines thick on the diseased side. In both, all the other bones are considerably thicker on the diseased side, than on the healthy side.

M. Esquirol possesses a similar cranium, and Greding mentions many, that were thicker on one side than on the other. Will any one, after this, deny the influence of the brain on the form of the cranium!

* If the ophthalmic couch, so called, belonged to the optic nerve, one of the sides of this nerve should have been considerably shrunken. But such was not the case; the simultaneous wasting of the optic couch, the corpora striata, and the hemisphere, proves that the optic couches and the corpora striata are only apparatus of supply (*renfort*) for the hemispheres, as we have demonstrated in our anatomy of the brain, by numerous proofs of another kind.

The Influence of the Brain on the Cranium in Subjects predisposed to Suicide.

There is no mental disease which surprises its prey more secretly, than the unfortunate disposition to suicide. I regret that I am not able to treat the matter thoroughly in this place. I shall confine myself for the present to the consideration of the cranium.

We have examined many brains and crania of suicides; in all we found the cranium very dense, heavy, and also very thick; or, if it was not thickened, it resembled ebony, as it does in every other species of mania of long duration. The heaviest, thickest, and densest of all the crania in my collection, is that of a man, whom, not only an unfortunate propensity influenced to destroy himself, but who, before committing the act, believed that he was bound in duty to immolate a wife whom he loved. At the end of the first volume, I have devoted a few pages to this terrible disease, and I have related many examples of it.

Three crania of suicides, for which I am indebted to the kindness of Baron Larrey, are equally thick and dense. Since this phenomenon is so often manifested in suicides, it is certain, that, in the greatest number of cases, this propensity for self-destruction is a true and real disease of the brain, although its remote cause often resides in the abdomen.

We have often found in great criminals, whose crimes were greater than the external circumstances of their condition would seem to indicate, the cranium in the same condition as that of maniacs. Let observers and judges bestow some attention on this subject!

The Influence of the Brain on the Cranium, in Lesions of the latter, and in certain Diseases of the Membranes.

Many cases are recorded, where, not only in infancy, but in adult age, portions of the cranium, forced inwards by external violence, have resumed their original situation, either immediately, or after some time. I have in my possession a cranium, in which a fragment of the size of an inch, of the superior part of the frontal bone, had been forced in. The external table has exfoliated; the inner one is still in the same plane with the rest of the internal surface of the cranium, although in many points of its circumference, the traces of the fracture can be distinguished. In consequence of the laws above established, all the anterior part of the cranium is thicker than the posterior part.

In another cranium, also, the whole internal surface is smoothed off, while we distinguish deep cavities on the external part, which are consequences of severe blows, which this individual, who was a soldier, had received at the taking of Otschakoff. (Pl. LV. fig. 2.)

In a third cranium, we distinguished many clefts and considerable fractures. The individual survived the accident a long time; for, with the exception of a few rents and hollows, the whole is very well re-established. One point is observed to penetrate some lines within the osseous cavity; but so much bony matter is deposited in this place, that the point in reality hardly projects; the cranium is thick and heavy.

Blumenbach also relates examples of the bones of the cranium being forced in, which have spontaneously, and all at once, resumed their proper situation some days after the accident. He cites also a dissertation of Obertauffer on this subject. A similar instance is reported in the *Archives* of M. Horn.

When excresences are formed in the membranes, they rarely encroach on the soft substance of the brain; but, on the contrary, they press outwards. The internal table of the cranium is absorbed; the external is elevated externally, and becomes thin and transparent. It is by prominences of this kind, that we recognise the existence of excresences, or hydatids, as well in animals as in our own species. I have preserved in my collection many crania of this kind.

In an intemperate man, the frontal bone was elevated in the region situated above the left orbit; for many years this protuberance gradually increased, without any other inconvenience than a swelling and palsy of the upper eye-lid. Finally, the memory and the other intellectual faculties of the man became enfeebled. The frontal bone continued to elevate itself more and more, severe head-aches came on, blindness, paralysis of the inferior extremities and incontinence of the natural excretions supervened; an apoplexy terminated his sufferings. There was discovered, under the prominence of the frontal bone, a considerable excrescence of the dura-mater; even the orbit was so much contracted, that the eye had been forcibly pushed forwards.

Petit saw a similar excrescence at the inferior surface of the anterior lobes; it pressed upon the orbits and displaced the eye.

When similar excrescences go on increasing, they end by perforating the cranium, and sometimes by acquiring, on the superior or lateral part of the cranium, dimensions equal to the head. (Pl. LV. fig. 4.)

In the state of disease, we see, daily, examples of the energetic manner with which the soft parts are capable of acting upon the bones. Aneurisms finally perforate the most solid bones. Excrescences wear away the ribs. I know an individual, who, having had the breast bone depressed by the elbow of his nurse, was rendered asthmatic for many years; but, finally, the continual effort of the lungs has caused the ribs to

yield laterally, they are curved more outwardly, and the lungs having acquired sufficient space, respiration is properly carried on. When the globe of the eye has been destroyed, the orbit gets sensibly contracted in two or three weeks. When, on the contrary, the globe degenerates into an excrescence, the size of which exceeds its natural dimensions, the orbit becomes dilated so far as even to displace the bones of the nose.

What I have said in this section, shows, under what circumstances we may infer, from the external form of the cranium, a greater or less development of the cerebral parts, and also teaches us, that we are not justified in deciding upon the form of the brain, or the degree of development of the different cerebral parts, from the form of the external surface of the cranium, in cases of mental alienation, in chronic diseases, whether of the brain or the bones of the head, in old age, and still less in decrepitude.

I shall now endeavour to explain, how I have been enabled to discover the seat of the cerebral organs.

SECTION II.

DISCOURSE PRELIMINARY TO ORGANOLOGY.

On the Difficulties and the Means of determining the fundamental Qualities and Faculties, and of discovering the Seat of their Organs in the Brain.

WITH the exception of the exclusive spiritualists, who deny all connexion between mind and matter, there exists a sufficiently general conviction of the truth of the principles, that I have heretofore exposed, and which constitute the basis of the physiology of the brain. These principles are the irresistible consequence of a multitude of facts, that we cannot fail to observe every day. It will be sufficient to direct the attention of the least judicious of my readers to these facts, to enable each of them, imperceptibly, to arrive at the same conclusions. This, however, is not the case with respect to the determination of the fundamental qualities and faculties, and the seat of their organs. Some are pleased to say and repeat, that this part of my discoveries is the weakest and the least demonstrated. Special organology is further accused of absurdity, extravagance, madness, charlatanism, and imposture.

Still the determination of the primitive or fundamental powers of the mind, and the locating the seat of their organs or material conditions, constitute precisely the doctrine of the functions of the different parts of the brain. So long as these separate and particular notions are not admitted, the physiology of the brain will remain in vague generalities. Without this detailed knowledge, how shall we arrive at the most important applications which can be made, either to the right understanding of numberless physiological, pathological, and psychological phenomena, or to so-

cial institutions, criminal legislation, education, national characteristics, the arts, or the study of philosophy? The mystery of the gradual perfectibility of living beings is only explained by the successive exposition of their mechanical aptitudes, instincts, dispositions, and particular talents; it leads us, step by step, from the worm to the insect, from the insect to the fish, from the fish to the amphibious animal; from this last to the bird, from the bird to the mammalia, and from this to man; so that this *chef-d'œuvre* of the terrestrial creation is displayed before us, as the most complicated machine appears to the eyes of the artist, as carried on by the simplest wheels and levers.

These reasons impose upon me the obligation of demonstrating to my readers in the most rigorous manner, each primitive quality and faculty, and the seat of its organ, and thus giving to this part of my doctrine, the highest interest, and the most incontestable evidence.

Let us first pass in review some difficulties, which are constantly opposed to the discovery of a true physiology of the brain, and which still prevent metaphysicians, philosophers, anatomists, and physiologists from adopting it.

How far from the true doctrine of the functions of the brain are those, who consider man as an isolated being, withdrawn from all the laws of nature, as the image of creation, the microcosm, a part of the soul of the world, a portion of the divinity, an emanation from eternal light; and who, consequently, reject every idea of the connexion of man with any object of the three kingdoms of nature, as absurd and incompatible with his essence?

How far from a correct physiology of the brain are those, who attribute all the phenomena of man to the soul, to a spiritual being, in its essence and its actions independent of all material conditions, which is the efficient cause of organization, and the first cause of all the operations of human life?

And what becomes of the opinions of those who maintain, that the principal part of man, which constitutes his superiority over all created beings, has neither seat nor local determinate points, since a simple being exists without being contained, and has no relation to space; that it cannot have organs, since there cannot be any relation of cause and effect between matter and spirit; that it cannot carry within itself any sign accessible to our senses; that the manner in which it acts is concealed from the scalpel, touch, sight, and every means of research; that we perceive nothing but contradiction between matter and the operations of intelligence; that the unity of consciousness, (*moi*,) the simplicity of sensation, the nature of an idea, revolt at a dependence on matter, and against any material situation; that the soul, relative to time and space, is hardly ever with the body; and that the mind is absent, when, in deep meditation, we are not conscious of impressions on the external senses, such as the sensation of hunger, thirst, pain? &c.

Happily, these magnetizing and absolute spiritualists address to us these last words: "What is, then, the brain, and for what does it serve?" and they answer with haughty disdain: "We know absolutely nothing of it; neither do we wish to know." What profound philosophy in this confession, and what noble resignation!

How can the idea of the fundamental, moral, and intellectual powers, and the cerebral organs come to those, who refer all the phenomena of animal life to a single principle, to sensibility or sensation, of which all the other functions, from the most obscure instinct to the most elevated faculty, are but modifications? or, to those, who, by a similar tendency to abstraction, reduce the whole moral and intellectual man to two, three, six, or seven faculties of the mind, independent of all organization, and absolutely free in their exercise? or, to those who make of the intelligence and the will, personified beings, manifesting

themselves, also, without the concurrence of organization, sometimes as instinct, sometimes as propensity, sometimes as a certain faculty?

How could those persons dream of positive, moral, and intellectual qualities, who believe that man and animals are born with the mind perfectly blank, like a *tabula rasa*, and who cause an indefinite number of instincts, propensities, and purely accidental talents to emanate from the impressions, received by means of the five senses, from education, from chance? &c.

How can they have directed their thoughts towards the observation of the fundamental powers and their organs, who have wandered in speculation; who wish to know how mind and body is united; how mind and matter act and re-act upon each other; what the mode of action of the faculties of the mind; what life itself is, the essence of thought; how the mutual influence of divisible matter and the indivisible mind takes place; how all the faculties communicate between themselves, so that many are simultaneous in their action; how they each select such knowledge as is appropriate for each; how they receive sensorial impressions; in what manner the brain *digests* sensations, and forms ideas from them; if the acquisitions of the memory are composed of printed characters engraven on the brain as in a book, or of images really painted on the brain; by what artifice the brain perceives ideas, the relations of ideas, and a long chain of reasoning, so that in reading, the eyes transmit to the brain, straight or crooked figures, the mere forms of the letters, only; how it is that this direct sensation, is precisely the one that escapes us; how, finally in this same reading, of which our eye is the sole agent, does our ear appreciate the harmony of a phrase, and judge of the sounds that it does not hear; what proportion is there between the concussion of a nerve, the concussion of a portion of the brain, of a portion of matter, by an articulate sound, by a gesture, and the sentiment of an offence, and the idea of injured

honor; and when the passions are expressed even by silence, where is then the shock, and what is the organ that is charged with this new perception? &c.

All these whys and wherefores do not refute a single one of the proofs, which I have brought forward in the treatise on the organ of the mind. Observe the difference between the language of the metaphysicians and that of the naturalists. The natural philosopher lays it down as a fact, that heat will lengthen a bar of iron, and that cold will shorten it; that some drops of water, absorbed by a piece of wood, cause immense masses of stone to split; that the electric fluid in the twinkling of an eye, dashes to pieces mnouments, which have resisted the action of many thousand ages. Let those reasoners present themselves, who cry out against the absurdity of thinking, that fluids, so movable, can exercise a similar action on the firmest and most solid masses, and they will demonstrate to you by sophisms, as conclusive as those against the action of the brain, that all which you take for facts, is absolutely impossible.

How can these metaphysical physicians find or adopt a physiology of the brain, who still oppose to it the following reasoning: "The observer of physiological functions, studies only effects, and seeks to refer them to natural causes, so far only as he considers these causes and effects as being of the same nature; it is always a real and apparent movement, which is deemed as produced by another interior movement, that is supposed to be concealed in the depths of the organization; thus, it is the movement of the heart which produces that of the circulation, it is the slow compression of the sides of the stomach, which contributes to the transformation of aliment to chyle, and so of all the secretory functions, where the organic effects produced are always homogeneous with their real or hypothetical cause, and which are taken in the same objective sense; although without going out of this uniform order of phenomena, we are

very often ignorant of the nature of their connexion, or reciprocal productions; but what kind of connexion, relation, causality, resemblance, or analogy can be conceived between phenomena of such a different nature, and, taken in two points of view, so essentially opposed as are on one part the physiological functions attributed to the different parts of the cerebral organ, the motion, for instance, and the real concussion or supposed product in the centre of a nervous system; and, on the other part, such sensible modifications, such intellectual or moral act, which is supposed to be the consequence of it. And if it is pretended to make here a contradictory and absurd connexion, even in the expression that is given to it, in comparing thought to an organic secretion, we would demand, that the material product of such a secretion, should be represented to us, by the aid of some one of our external senses; let any one show us how the received impression is transformed into perception, recollection, image, judgment, in the same manner that we can see physiologically the alimentary paste successively transformed into chyle, blood, and into the different secretory and excretory fluids, which always remain accessible to the senses in their different metamorphoses."

After this language, any one would say, that physicians were thoroughly acquainted with the relations which exist between the nerves of the spinal marrow, sensibility, and voluntary motion; between the olfactory nerve, the optic nerve, and odor and vision; between the spermatic vessels and all the properties of the *semen;* between the intestines and the aliments assimilated to the specific nature of each individual. On the other hand, *concussion*, *digestion*, and *secretion*, appear to be their favorite causes of all physiological phenomena, since, at every moment, these expressions are made use of in their objections against the cerebral physiology. It is thus, for I must continue to be faithful to my method of replying, that the eyes

and the ears digest the light and the vibrations of air, and that they secrete vision and hearing; that a moderate shock, suspends or destroys the faculties of perception, memory, imaginatton, judgment, which is a proof in favor of the proposition, that the shock produced in the centre of the nervous system is essentially opposed to these functions; it is in this way that speech, and gestures, are the chyle and the blood successively formed from the alimentary paste of thought, the affections, and passions! Such is the sagacity of men, who pretend to deny the functions of the brain, because its mode of action has nothing analogous with the heart, the stomach? &c. And these same men, who protest so learnedly against all kind of connexion, relation, causality, resemblance, or analogy, between phenomena so entirely different in their nature, and derived from points of view so essentially opposed, as the physiological functions attributed to different parts of the cerebral organ, for example between any intellectual or moral act and a motion or shock, how can they admit, a few pages farther, that the signs, indicating division or a real separation of the cerebral localities belonging to different faculties, can be inferred, with a sufficient degree of certainty, from the states of delirium, insanity, or partial mental affections? Is it, then, the name of M. Pinel which has the magic power of creating a relation of causality and analogy between the brain and the intellectual and moral acts? Would not they be much more consistent, if they frankly denied that the diseases of the brain, as well as intoxication, strong emotion, narcotics, &c., could induce madness, eitheir total or partial, or any other alteration of the intellectual or moral faculties?

"If there was an organ," continues the same author, "a fixed seat in the brain for each kind of affection, each disposition of sensibility, or for each of the modifications of the temperament and the character, of which the experienced physician could only read the

signs but in the whole of the organization, in the acknowledged predominance of some internal organ; if there was, I say, such an established cerebral sign for each passion, whence could those continual variations come, that each of us constantly feels in his own dispositions? As the man, who has the nerve of sight, or hearing, well formed, always sees or hears equally well, or nearly so; for the same reason, he who has the organ of courage, ought to feel himself equally strong and courageous, or nearly so, at all times. Why is it, then, that while the protuberance, belonging to such a particular sentiment or passion, remains the same, there are so many and such continual vicissitudes in the corresponding affection or sensitive disposition."*

This passage abounds with inaccuracies and suppositions, that the physiology of the brain disclaims. The affections and dispositions of the sensibility, the modifications of the temperament, have never been derived from a cerebral organ. The author of this article would have done better for himself, and for the honor of the *Dictionary of Medical Sciences*, if he had commenced by studying, or at least by reading my works, before he had arrogated to himself the right of censuring the physiology of the brain. He would have found his *homo duplex*, and the means of establishing his reasonings rather on facts than on metaphysical dreams.

Another obstacle equally chimerical, is to dream of a physiology of the brain: I understand, that it is still professed in the schools of physiology, that the faculties of the mind are by no means an object of physiology; that being of a nature entirely opposed to the other functions, they are above the sphere of observation; that we can know nothing of them; that, consequently, it would be absurd to endeavour to find any connexion of them whatever with organization. Intelligence and volition are free operations of the mind,

* Dictionaire des Sciences Medicales, Tom. xxxvii.

simple powers, spiritual, in no way in contact with matter, and without any dependence upon it. Thus, with a haughty modesty they refer to another tribunal all the moral and intellectual part of man.

As to the other functions, the same professors instruct their pupils with an admirable ability. Let us see, then, if the difference of our knowledge in the physical phenomena, and in the moral and intellectual phenomena, is such that it ought to oblige us to renounce these last.

First, all our knowledge of the functions of organization is empirical; for the structure of the organs has never enabled us to discover any function, not even the circulation of the blood, or the irritability or the contractility of muscles. It is from experience that we know that the liver secretes bile; it is from experience that we learn the multiplied functions of the lungs. All our positive knowledge in natural history, in natural philosophy, in chemistry, in medicine, has its source in experience or empiricism. How inconsistent, then, is it to reproach the physiology of the brain, that the qualities and faculties, and the localities of their organs are first proved by experience and then confirmed by general principles, which could not even be established but by experiment! Our acquisitions would be much more sure and stable; they would never have receded, if we had never gone astray on the hollow and sterile ground of speculation. I refer to ideology and metaphysics. Let us continue the examination of the nature of our knowledge. We know that the stomach digests; that the food is transformed into chyle and into blood; that the blood furnishes the materials of an infinite number of other secretions; that the semen contains the germ of all the physical, moral, intellectual, and hereditary dispositions of the individual. We know that we smell with the nose, hear with the ears, and see with the eyes. We know farther, that all these functions are deranged when their organs are diseased. Thus we

know the facts, and some conditions which are requisite in order that these facts should occur; but the why and the wherefore are almost always unknown to us.

Well, this is precisely as much as we know in regard to the intellectual faculties and moral qualities. We know, that they are not the accidental product of the fancy of the mind, of sensorial impressions, of education, or other external circumstances; we know that they are innate and determined by nature herself; that their exercise is dependent on organization; that they arise, grow, decay, simultaneously with it; that the intellect and the will, the perception, the memory, the judgment, the imagination, the attention, &c., are sound, changed, enfeebled, exalted, or void, according to the condition of the brain. We know, that in the different species of animals, the instincts, propensities, and faculties increase and diminish with the perfectibility or the debasement of this organ. We know by analogy, by a thousand proofs, physiological and pathological, by an infinite number of individual facts, by comparative anatomy and physiology, that the brain is a collection of many organs, and that each instinct, propensity, and faculty is manifested by a particular organ. Observations, infinitely multiplied, or the most constant experience, have taught me the seat of each of these organs, &c. All these propositions are decisively proved to all those, who have given themselves the trouble to study all the branches of the physiology of the brain. I defy physiologists to know more of any other function of organization.

Nevertheless, still revolting against the idea, that even the manifestation of the superior faculties of the mind, reason, will, &c., depend upon organization, and making no account of idiotism, insanity, madness, delirium, &c., the metaphysicians believe they are enabled to combat us by an irresistible argument. The ME, [individual consciousness,] say they, remains always the same, although by a continual succession of composition and decomposition, the organs of the

body are so changed in the course of a few years, that there does not remain a single atom of those that formerly composed it. Hence the ME, the consciousness, the mind with all its attributes is not in any connexion, in any relation with matter.

Similar causes produce similar effects. Hence new compositions are made after the type of the preceding ones. Hence there results the same form for the nose, the mouth, the hands; you smell, see, hear, and walk nearly in the same manner as you smelled, saw, heard, and walked ten years ago. So also, the new compositions of the brain are formed after a preëxisting type, and hence there results the same moral and intellectual character; provided that your argument is completely founded in fact.

In this argument, you are only correct so far as you really preserve the consciousness of your personality at all times. But your ME undergoes modifications always in harmony with the modifications of the organization. From the moment of your birth to the age of puberty, from this to old age, how many modifications take place in your tastes, affections, propensities, passions, and talents! There are cases, where, by an alteration of the organs, the ME is transformed into another ME; for instance, when a man believes himself transformed into a woman, a wolf, &c.; there are other cases, where the old ME is entirely forgotten or replaced by a new one; not an uncommon accident after severe disease, especially in cerebral affections. Thus, this objection, so captivating, is rather an illusion, so far as it seems to prove the independence of the mind on organization. But let us return to it.

So long as the brain was considered as a spongy mass, inorganized; as a collection of impure viscera; as a secretory organ, as a pulpy mass, as a simple envelope of the origins of the nerves of senses, as the reservoir of the vital spirits, of the nervous fluid, how could any one have the most obscure presentiment, that there

existed a connexion between a similar mass and the moral and intellectual faculties?

When they began to consider the brain as making a part of the nervous system, it was not difficult to suspect, that it performed an important function. It was seen, that the nerves of the spinal column were necessary to voluntary motion, that the nerves of the five senses exercised the functions of smelling, seeing, taste, hearing, and touch. With a very little reflection, one could be easily convinced, that the brain served as the organ of intelligence. But the moral man, the propensities, affections, passions, and sentiments remained reserved for the temperaments, for the heart, for the plexuses and the ganglia of the chest and the abdomen.

It is but a few years, since all those who were at the head of insane hospitals, or who wrote on insanity, considered mental alienations, either as diseases of the mind, with which the body had no part; or they placed their immediate seat in the chest or the viscera of the abdomen. This general belief not only diverted the attention from the true seat of these diseases, but it deprived the physicians of mad-houses of one of the most precious and most fruitful means of discovering the true fundamental qualities and faculties, the relation of their alterations with the changes of the brain, the correspondence of partial alienations, or monomanias, with the plurality of cerebral organs, and their partial suffering, &c.; and finally of exposing the erroneous doctrines of philosophy, which are still professed in all the universities.

I rejoice in having been the first, who has attacked these errors of our most respectable authorities, and of having effected the most happy revolutions, not only for the study of the nature of mental diseases, but also for their treatment. Let it be remembered with what perseverance I have combated these fatal prejudices, in my public lectures, and in my works. Let any one also read the work of M. Spurzheim on Insanity, &c.,

and let any one compare the old articles, *Mental Alienation*, *Madness*, *Insanity*, *Delirium*, *Monomania*, &c., in the *Dictionary of Medical Sciences;* the work of M. Pinel, and in many respects, inestimable; with the new opinions of M. Esquirol, and with the excellent works of MM. Georget and Falret, and their striking difference will abundantly testify, that positive knowledge, frankly announced, always ends triumphantly.

The greatest miracle that the metaphysicians or the reasoners have achieved, is, in persuading anatomists and physiologists, that organization and its results are quite the opposite of what they really are. We see objects single, we see them straight, we see them at a distance, but reasoning has proved that we see them double, upside down, and immediately in the eye, &c. It is thus that anatomy demonstrates, that the nerves do not derive their origin in the cerebral substance; that the different parts that constitute the brain arise, strengthen themselves, and terminate in different places; which ought to lead to the presumption, that these different distributions of the nervous filaments of the brain, are destined to different functions. The metaphysicians, on the contrary, have established that the mind being simple, its seat in the brain ought to be equally simple, and the physiologists who had, as they supposed, discovered that the brain is the organ of the mind and of human nature, had the complacence to reduce their organ of the mind to a single point, and this single point was charged with being the rendezvous of all the nerves, the common centre, the organ of common sense, the seat of all the operations of the mind. But at the moment when they flattered themselves with having preserved the simplicity of the mind, it never occurred to them that a point, in order to be single, is not necessarily an immaterial point. It has always resulted from this artifice of the ideologists, that their dupes, the physiologists, have had, and still have a horror of all idea of a plurality of organs for the different faculties of the mind.

The mind being simple, the ideologists conclude from this, that all its acts, thought, understanding, will, judgment, reason, imagination, were also necessarily simple, and could not in their exercise be subject to matter. I do not know how they could elude the examples of stupidity, madness, delirium, in short of derangement of all the functions, in consequence of a defective organization, of the diseases of the brain, of intoxication, &c. If we oppose to them analogous functions in brutes, it must either be admitted that animals possess mind; or, those who consider animals too degraded to be endowed with so noble an inheritance, must make of memory, imagination, judgment, instinct, propensities, passions, the will, intelligence, material functions, without perceiving that this method of reasoning is but a snare set by the materialists; for, from the materiality of the faculties of animals, it would not be a great step, to the materiality of the faculties of man. However it may be, the theory of the simplicity of the qualities and faculties of the mind, does not admit of seeking many organs for their manifestation.

Those who did not believe, that the brain was a particular system, independent of the other nervous systems, who took the whole mass of the hemispheres for the result of the concurrence of all the nerves of the body, how could they attribute other functions to the brain than those proper to the nerves? This error was in harmony with the complete ignorance of an internal source of sensations, ideas, propensities, and talents, and it wonderfully confirmed the ruling axiom which has always paralyzed the physiological researches of the brain; that nothing is in the mind which has not previously existed in the senses.

Hydrocephalic individuals have been observed, that enjoyed almost entirely their moral and intellectual faculties; still it was believed that, in these cases, the brain was disorganized, dissolved, &c. With such an opinion how could it be believed, that the brain con-

tributed in the least towards the functions of the mind? The false interpretations put upon certain lesions of the brain, brains that were said to be ossified, with the mind in a state of integrity, children endowed with many intellectual faculties, and whose crania had been found entirely deficient in brains, &c., fully confirmed the opinion already so much accredited by philosophers.

In general, history teaches us, that anatomical and physiological knowledge has almost always been upon a level with the philosophical knowledge of the time. As intelligence and will were the only powers of the mind which were known, there was only sought in man and animals some measure for the abstract idea,—*intelligence*,—without regarding any instinct, propensity, or faculty in particular. They sought for this measure in the absolute size of the brain; in its different proportions with the body, the nerves, with the other cerebral parts, with the face, &c.; they sought it in the facial line of Camper, and they neglected the study of the different parts of the brain, as compared with the different faculties of the animal.

It is true, they discovered, very early, many cerebral parts of different forms, colors, consistence, and organization, such as the bridge of Varolius, the great crura, the pretended optic thalami, and corpora striata, the corpora quadrigemina, &c., and they were tempted to proclaim these parts as different organs; but they discovered at the same time, that these parts were found in the brains of the mammalia, which was a proof that the brains of the mammalia were composed of the same parts, as the brain in the human species; consequently, said they, it is not right to admit these parts as organs of the different human qualities and faculties.

On the other hand, it was believed that the brain of certain species of animals, was deprived of some of the parts of the hemispheres, although these same animals were endowed with qualities, that were attributed to these parts in the brain of man.

How could they avoid this difficulty? Anatomists and physiologists did not then know the laws of the organization of the nervous system; they did not know the office of the grayish, reddish, gelatinous substance; they could not divine that all these different parts, that were found as well in the brains of the mammalia as in that of man, are only the apparatus of the origin and reunion of the nervous filaments, of which the hemispheres are composed; and of which the different bundles or particular distributions, are the true organs. But, if anatomists had compared the brains of the other mammalia with that of man, and the brains of the mammalia with each other, they would have ascertained that all these brains did not, by any means, contain the same parts on all the same organs. They would have found also that the absence of the posterior lobes of the hemispheres, in some species of the animals, is only apparent, as I demonstrate when treating of the organ of the love of offspring.

I have come now to the obstacle which has had the most powerful influence in retarding the physiology of the brain, and which our philosophers and our physiologists will not soon surmount, even now.

At the commencement of the *Treatise on the Plurality of the Cerebral Organs*, vol. II., I have cited many ancient and modern authors, who had hinted, that the different moral and intellectual powers of the mind ought each to have their particular organ in the brain. I have asked myself after this, how it could be conceived that not a single anatomist or physiologist had discovered a single organ, and that all had terminated their researches by despairing of the possibility of this kind of discoveries; and, at the same time, laid this to the charge of those false philosophers, who, for thousands of years, have been, and still are sustained in our schools and in philosophical works.

In the first volume, I have already cited the opinions of different philosophers on the faculties of the

mind. Understanding, will, sensibility, desire, voluntary motion, intelligence active and passive, speculative and practical reason, reasoning, imagination, liberty, thought, sentiment, action, attention, comparison, memory, judgment, reflection, recollection, desire, preference; these are nearly the qualities and faculties, that were supposed to be the only faculties of the mind of man. Some adopted a single one only —sensibility, attention, for instance, as the fundamental faculty and origin of all the rest. Others admitted two, three, seven, as the general source of all.

When it was required to suppose the existence of, or even to seek for an organ, it was for one of these faculties of man, that a search was made; they sought then an organ for perception, memory, judgment, imagination, understanding, will, attention, and so on.

But, in these researches, no one consulted experience; no one observed the difference in the brains in comparison with the differences in the moral and intellectual characters of individuals; no one made any use of comparative anatomy and physiology; no one conceived the idea of making an instructive collection of the crania of men and animals that had been remarkable for the energy of any one faculty or quality whatever. Every one gave free scope to his imagination. It was the pineal glands, the corpus callosum, the cavities of the hemispheres, &c., which by turns presided over such or such a faculty. What one built up, another destroyed, since neither the one nor the other could base their suppositions on facts, sufficiently constant or multiplied.

In fine, it was impossible, and it will always be impossible, to discover an organ for any of the faculties that I have just named. Instead of being radical, fundamental, primitive faculties, they are only abstractions, generalities, general attributes of true fundamental powers. Let me explain myself: the faculty of the relations of space, and the faculty of the relations of

sounds, are two particular talents, two primitive fundamental talents. But, in the faculty of the relations of space there is perception, since it is necessary first to perceive the relations; there is attention, without which these relations would not in the least determine the individual; there is recollection and memory, otherwise no animal would find again the place of his habitation; there must be comparison and judgment, otherwise the individual would confound one place with another; and the landscape painter who combines or who invents situations, ought to have imagination. So also the musician would not be a musician, especially a composer, if he did not perceive the relations of tones, if he had neither recollection nor memory, if he did not judge of melody and harmony by these relations; if he had not imagination to invent new combinations. Thus attention, perception, memory, judgment, imagination are nothing else than the different modes of action of every one of the fundamental faculties whatever. They are essential to each of these faculties, when they are graduated to the power or ability to create, — to that which we call *genius*. When they are weak, there is a feeble degree of attention, of perception, of memory, a defective judgment, and no imagination.

This explains how it can happen, that one may have strong attention, easy perception, a tenacious memory, and extremely correct judgment, an inventive and brilliant imagination in one particular talent, and be almost imbecile in another.

It is the same with all the talents and faculties. Perception, attention, memory, judgment, imagination, intellect, intelligence, thought, comparison, reflection, preference, understanding, are not powers existing by themselves. They necessarily belong to an object, to a particular talent, and are only attributes of it. But philosophers have always neglected the talent or the particular determinate object; or, in other words, they have made an abstraction of the fundamental faculty,

and have rested on general attributes, on generalities, on their abstractions.

This way of proceeding is the most convenient and the most natural to the human mind. Children always commence by seizing the general properties before they observe the differences of individual objects. They know the young of animals, in general, before they know the calf, the colt, the duck, the chicken, in particular, &c. They know the dog before they know the grey-hound, the bull-dog, the terrier. We all know what a bird is, without thinking of the difference between a tom-tit and a nightingale, between a chaffinch and a greenfinch.

But in nature, these abstractions, generalities, general attributes have no reality, no proper existence. Extension and weight are general attributes; but these two general attributes exist only in abstraction, in thought. In nature, extension and weight are inseparable from a determinate body. The true naturalist seeks to know these bodies, knowing very well that it is impossible for him to find extension and weight in an isolated existence.

Every reader will now understand why the philosophers and their imitators, the anatomists and the physiologists, have never been able to discover any organ, nor any external sign for the faculties of the mind, such as were adopted, and such as they are now established, in all the schools of philosophy.

The same fault has been committed, when the instinct, the affections, the passions have been considered as positive things; these are so many abstract notions. Instinct is not an *unit*. There is an instinct of propagation, an instinct of love of offspring, an instinct for constructing, an instinct for travelling, &c. It is these particular instincts which have an independent existence, which determine the peculiar nature of the individual; it is these only which have their appropriate organs, and which it is possible to discover.

Further, the passsions are nothing abstractedly con-

sidered; they are the very energetic activity of the propensities and talents. There is passion in the propensity for propagation, as there is passion in the talent for music. How then can we find an organ for the passions?

The affections are simply the modifications of the different organs. Pain and pleasure, joy, fear, chagrin, modesty, anger, despair, pity, &c., take place when certain organs are affected in a particular manner. Consequently there cannot be an organ or a seat peculiar to the affections. Organs only exist for the propensities and the talents which can be affected in a thousand ways, or, the activity of which can be increased even to passion.

When I have exposed the fundamental qualities and faculties, that I have ascertained up to the present time, I shall be able to present the true philosophy of man in its clearest proof. What I have just said will, for the present, be sufficient to convince the reader, of the defects of the philosophy of our metaphysicians, and he will conclude with me, that it is by their chimerical doctrines, that the progress of elevated physiology, or, the study of moral and intellectual man, has been most fettered.

Let any one imagine to himself, from a consideration of all these difficulties, how far we ought to expect, on the part of anatomists, physiologists, and professed metaphysicians, an exact judgment on my discoveries. In the number of those who are in a favorable position for verifying and sufficiently multiplying experiments, how few are there, who are endowed at the same time with a taste for the study of nature and with a physiological spirit! How rare, also, it is to find men of a fitting age, who, by an uninterrupted cultivation of science, have preserved a sufficient degree of flexibility, to abandon old errors and receive new truths!

Let us count also among these obstacles, the reputation which those professors enjoy, who despise the

new doctrines, so called, who, by their decisive and peremptory tone, sink their disciples in security and pernicious indolence; let us reckon also, the pretensions and the still more despotic decisions of learned societies and academies, who, ridiculing, with Boileau, the decrees for the maintenance of the doctrines of Aristotle, prepare the same spectacle for their successors.

It will be seen how necessary it was to remove difficulties before I could determine one single fundamental quality or faculty. Happily these obstacles were presented one by one. So long as a quality or faculty, or its organ, remained undiscovered, I never had the least anticipation of what I should eventually find, nor of the place where I should discover the organ. Entirely abandoned to nature, it was requisite that I should have a considerable number of striking facts to afford me a slight presentiment, and a much greater number still to put me on the proper track. How many times, after years, have I been obliged to reject that which had appeared to me well established! How many times have I been tempted to renounce all my researches, and to admit what those who had gone before me had maintained, that it was impossible to discover the traces of the operations of the mind!

However, the numberless observations that I had made from my infancy on man, in my intercourse with my brothers and sisters, with my play-fellows and school-mates, and those that I had made on animals of every species, awakened me from my despondency. Finally, the powers of facts became sufficiently powerful to convince me of the reality of my object and the possibility of obtaining it.

Thus, in consequence of the accumulation of facts, light came gradually upon me. I discovered sometimes one fundamental quality or faculty, sometimes another; at one time, one organ, at another time another; and as these discoveries were multiplied and confirmed, the prejudices, the scholastic errors, and fears disappeared.

As so large a number of naturalists and physiologists still doubt the possibility of discovering the functions of the different parts of the brain, we shall proceed to the discussion of the means, that we have believed ourselves able to employ, up to the present time, and those which we have employed with the greatest success.

OF THE MEANS NECESSARY TO DISCOVER THE FUNCTIONS OF THE DIFFERENT PARTS OF THE BRAIN, OR OF DETERMINING THE FUNDAMENTAL QUALITIES AND FACULTIES AND THE SEAT OF THEIR ORGANS.

Of Anatomy, considered as a Means of discovering the Functions of the different Parts of the Brain.

I shall speak here of the anatomy of the brain under four different points of view; of the anatomy of the brain, as a simple dissection or examination of the conformation of the brain; of the physiological and pathological anatomy of the brain; and of the comparative anatomy of the brain. The first must necessarily be as barren in leading us to the discovery of cerebral functions, as the three others may become fruitful. But up to the present time the physiology of the brain has received no advantage from anatomy, under any point of view whatever, for the simple reason, that no one has yet had the least idea of the nature of the functions of the brain; that is to say, not the least idea of the fundamental qualities and functions, which belong to the different parts of the brain.

Of the Simple Dissection of the Brain as a Means of determining the Moral and Intellectual Fundamental Powers, and of discovering the Seat of their Organs.

There are but few cases, where the structure of parts, enable the anatomist to understand the functions which depend upon them; and when that happens, his ideas are merely conjectures. Thus the bones and the ligaments are examples of this kind. Before having seen the motion produced by muscles, their figure does not enable us to divine either their irritability or their contractility. The dissection of the stomach, the liver, the kidneys has not taught the functions of these vicera. What purpose would it serve to know the structure of the eye and the ear, if experience had not taught us their uses? Would the most profound perspicacity ever have attributed the sense of smell to the pituitary membrane of the nose, and the sense of taste to the nervous papillæ of the tongue, when even to this day anatomists still dispute, to which nerve the gustatory faculty belongs? The tendons and ligaments have been confounded with the nerves, for ages; and the organization of the heart has had so little influence in leading anatomists to a knowledge of its functions, that, to the time of Harvey, the arteries were considered as conducting tubes of air.

It was infinitely more difficult still to discover the functions of the cerebral parts by their simple dissection. There are in the brain neither muscles nor levers for motion; there are no excretory canals, no external apparatus, no extension, no relaxation, no concussion or oscillation of fibres, no refraction of the rays of light, no vibration of air, no liquid in motion. The functions of the nerves and of the brain differ essentially from every other function of organized parts; they are of a peculiar nature, beyond the reach

of our senses and our imagination. Although exceedingly varied, and diversified in themselves, we could hardly conceive of the possibility of any difference in the intimate structure of their innumerable fibres, and consequently would not imagine any difference in their functions, if we did not reflect that the myriads of fibres, among which we do not observe any difference in animals and vegetables, have nevertheless a difference among them, which is evidently proved by the diversity of their effects. In whatever region we examine the two substances that constitute the brain, we can hardly perceive any difference between them, either in their structure or their chemical composition. The nervous fibres, it is true, are sometimes more or less firm, white, or bony; they are directed sometimes in one sense, sometimes in another; the convolutions of the hemispheres are sometimes narrower, or broader, or serpentine, &c. What inference can the anatomist draw from all this?

It is then demonstrated, that the knowledge of the parts and of their form, direction, consistence, color, &c., never leads to the knowledge of their functions. Almost always has the knowledge of functions preceded that of the parts. It was not necessary to know the structure of the eye, nor the mode of existence of the optic nerve, to know that it was the organ of sight. For a long time it was not believed, that the nerves were necessary to the functions of the senses, because it was thought, that the sanguineous vessels carried the impressions to the heart, the supposed seat of the soul.

It was also without the assistance of any anatomical guide, that I made all my physiological discoveries; and these discoveries might have existed for ages, without their concordance with the organization of the brain being ascertained.

Whenever it has been attempted to advance the pretended knowledge of organization before that of functions, it has been altogether conjectural, and wore

the impress of the prejudices of the age. It is in this way, that the heart has been constituted the seat of courage, love, sympathy, cruelty; the liver was formerly the seat of anger and physical love; it is thus, that, even to this day, the moral and intellectual faculties are made to arise from a mixture of the humors on the temperaments; and the dispositions and passions take their rise in the abdomen or from the solar plexus. If anatomy were a sure guide in establishing the uses of different parts, would Willis have said that the vital spirits, necessary for motion, were secreted in the cerebellum? Would Galen have connected the organ of smell with the anterior cavities of the brain? Would the soul, alternately dislodged from the pineal gland, the corpus callosum, the annular protuberance, &c., have been replaced by Sœmmerring in the vapor of the cavities of the hemispheres, and by Ackermann in the medullary substance which lines the interior of the same cavities! Would memory have been placed sometimes in the gray substance, sometimes in the posterior lobes of the hemispheres; judgment sometimes in the fibrous substance of the hemispheres, sometimes in their cavities? This is one of the sources of the errors of Descartes, of Albert-le-Grand, of Servetto, of Auranti, of Van-Helmot, of Lancisi, &c.

We ought at least to expect, as I have mentioned in another place, that anatomists, on seeing the great diversity of the cerebral parts, would have been the first to deduce from it the diversity, and consequently the plurality, of the organs of the powers of the mind. But, in our day, we cannot persuade ourselves any more than Vicq-d'Azyr, of the plurality of the cerebral organs; a very striking proof, how little the simple knowledge of any mechanical structure, is capable of enlightening the physiologist.

It is rather by observing physiological phenomena, that we arrive at a more just idea of the brain. Accordingly, it has been requisite for me to collect a great number of physiological and pathological facts, before

I could come to any rational induction respecting the laws of its organization. I owe almost all my anatomical discoveries to my physiological and pathological conceptions; and it is only from these, that I have been able to convince myself of the perfect accordance of the moral and intellectual phenomena, with the material conditions of their manifestation. It is, therefore, more and more apparent, that they are but false suggestions of those of my opponents, who, pretending that I had arbitrarily interpreted my anatomical discoveries, endeavour to throw distrust over my physiological discoveries on the functions of the cerebral parts.

The Anatomy of the Brain in its Physiological Applications, as a Means of discovering the Fundamental Powers of the Mind and the Seat of their Organs.

Without doubt the anatomy of the brain, would have afforded anatomists and physiologists the first impulse for meditating on the meaning of its organization, on its agreement with the forms of the head, and the modifications of development of its different parts, if they had ever brought to the subject other views, than those purely mechanical.

The organization of the brain, although analogous to that of the other nervous systems, is still so wonderfully finished and perfected, that we are enabled to divine its high destiny. But what are generally the preparatory acquirements of those who devote themselves to anatomy? To be a great anatomist, it is only requisite to have a great deal of patience, good instruments, good eyes, and dexterity in the use of the hands. It has never been considered, that philosophical studies, natural history, natural philosophy, should be regarded as indispensable, or even useful, to the anatomists. And even if the dissectors of the brain should have been imbued with the philosophy

of Locke, of Condillac, &c., they would have had one reason more for always remaining strangers to all idea of its use. The mind having always been considered by a philosopher as having no relation with the body; and all its moral and intellectual powers having been derived from the impressions on the five senses, an especial organ for all these functions, was superfluous.

The division of the brain into two hemispheres, into many lobes, into many other parts very distinct in their form, their direction, consistence, color, and the varied although constant distribution of its two substances, should have induced among the anatomists a suspicion, that all these variations might be destined for different functions; the more, because the division of the other nervous systems, into two equal parts, their subdivisions into particular nerves, and their varied and different uses, afforded them a striking analogy. But very few physiologists have manifested a presentiment of this. With most of them, this light, so clear, has thus far been obscured by the gloomy ideas of the metaphysicians. The spirituality of the mind, according to their conceptions, required a simple seat, a single point, a centre of the common senses, &c. These ideas have occasioned the loss of all the fruit, that they would have been able to collect from antecedent knowledge, so rich in its application.

They would have been enabled to observe, that the fibrils of the brain, manifest themselves later as distinctly as the fibrils of the other nervous systems, whose functions are earlier called into action; that precisely in the same manner as the different subdivisions of the nerves, the viscera, the spinal marrow, and the senses are not simultaneously developed, so also the different parts of the brain are not developed simultaneously; that consequently, in the same manner as the functions of the other nervous systems and subdivisions, are destined to different fuctions which succeed each other, so also the brain and its subdivisions ought to be equally

destined to different functions which succeed each other. We may observe that in new-born infants, the frontal parts of the brain are much less developed than the middle lateral lobes, and that from the age of four months to ten or twelve years. That the cerebellum is generally very slowly developed, towards the age of puberty; that the whole cerebral mass diminishes in old age, but that this diminution does not affect all the parts of the brain at the same time; they could observe that in man, certain parts are generally more developed than in woman; that other parts, on the contrary, are more developed in woman; that the volume of the brain is very different in different individuals; that the hemispheres in different individuals sometimes present small contracted convolutions, sometimes large and prominent ones; sometimes large and prominent in one part of the head, and small and contracted in another. They could have remarked that the heads of different individuals have quite variable forms, and that these variations correspond with the variations of the form of the brain; that the heads, and consequently the brains, of different nations, present very different forms, &c.

Ought not all these circumstances to awaken the attention of anatomists? Ought they not to be able to excite their curiosity on the signification of all these different parts of the brain? Should they not have viewed these physiological facts with a reference to these anatomical phenomena? The inactivity of the mind of the new-born child, and his great need of nourishment and sleep; the growing activity of the faculties of children, especially the faculty of observation and abstraction; the successive apposition of the instinct of physical love towards the age of puberty; the successive but not simultaneous diminution of the vigor of our moral and intellectual faculties; the difference in the sentiments, propensities, and the intelligence of man and woman; the difference in the moral and intellectual character of different individuals; the dif-

ferent energy of certain propensities and faculties in the same individual; the difference of national character, &c. But nothing of all this has happened. Now only since the fundamental powers and their localities have been determined by experience, that all these circumstances have been referred to the brain, and serve admirably to confirm the physiological discoveries, and to demonstrate their harmony with the cerebral organization.

Of the pathological Anatomy and Physiolagy of the Brain, as Means of discovering the Fundamental Powers of the Mind and the Seat of their Organs.

The pathological anatomy and physiology of the brain, so far from putting anatomists or physiologists on the track of any fundamental quality or faculty, or the seat of their organ, have not even been sufficient to convince them, that the brain is exclusively the general organ of the moral qualities and intellectual faculties. They have even seized upon the lesions and the diseases of the brain to prove that, with very considerable alterations of the brain, all the faculties of the mind can exist and be exercised in their full integrity. It has even been necessary for me in my second volume, to enter into a long discussion to refute these pretended observations, that are brought in support of this error.

I have been able to show, that, previous to my anatomical and physiological discoveries, there did not exist the necessary knowledge, to determine with exactness the malformations, lesions, and diseases of the brain, nor the means of judging with correctness of the influence, that the lesions and diseases of the brain exercised on the moral qualities and intellectual faculties.

As to mental alienations, madness, idiotism, universal or partial insanity, I was still obliged to combat

the highest authorities, MM. Pinel, Esquirol, Fodéré, to establish that all the mental diseases always have their immediate seat in the brain. The public were so little enlightened by pathological facts observed in the brain, that it was still boldly maintained, that cases existed, where a hemisphere of the brain and even the entire brain, had been destroyed, and where not the least trace of brain was found; where it had been dissolved or disorganized by collections of water in the cranium; where it had been ossified; without the cessation of the exercise of the mental faculties.

Would it not have been expected that physicians, who are the most inclined to observe and study mental alienations, and to make examinations of the dead bodies of the insane, would be the first, not only to find the immediate seat of these diseases, and the most convincing proofs of the plurality of the organs, but also, the fundamental qualities and faculties? They present you with numerous cases where persons, who manifested an involuntary excitement in some particular, that is to say, who were on the borders of insanity, and have been preserved from it, by resorting to occupations which were foreign to the object which had taken so great an ascendency over them. Could they not have been able, with Bonnet, to infer from thence, that in thus acting they allow certain parts of the brain to repose, whilst at the same time they put other parts in activity? They every day see cases, where certain qualities certain faculties are injured, whilst other qualities, other faculties remain sound; cases where the individuals are rational or irrational on a single point. They show you examples of rational alienation, since those who are effected by it, perceive and combine in every other respect, as rational beings. They speak to you of cases where the affective faculties are singularly troubled, whilst the intellectual faculties are in the most perfect calm, and *vice versâ.* They have every day under their eyes cases of imbecile people, who are only so in some respects, and

who in other relations, sometimes evince an astonishing degree of intelligence. Every day they attend insane people in whom sometimes physical love, or murderous rage, or the passion for robbery, or haughtiness, or religious fanaticism, &c., stifles every other idea, every other sentiment.

Could they make no use of similar facts so strongly marked, nor seize with avidity, that which nature so often presented them? But no; philosophical errors held them captive in spite of the demonstrations of nature, the most opposed to their prejudices.

The observing mind of M. Pinel had been forced to observe the falsity of the doctrines of Locke and Condillac. Not content with ascertaining the insufficiency of the division of the faculties of the mind, into affective qualities and intellectual faculties, he expressly says that the different alterations, which the moral and intellectual faculties sometimes undergo, invest themselves with such varied forms, that the subdivisions of their principal divisions are as different, and as strongly marked among themselves, as the principal divisions are. See him then ready to shake off the chains of metaphysics! and at the same instant, he and his worthy and respectable pupil, M. Esquirol, bend to the yoke, and pretend that they have observed, in a healthy state of the other functions of the mind, partial lesions of the physical sensibility of perception, attention, memory, of the principle of the association of ideas, judgment, imagination. The reader will recollect, that I have proved in the second volume, that in none of the cases, cited by MM. Pinel and Esquirol, did there occur more than one of these common attributes of lesion, whilst the others could have existed without alteration.

We see then with melancholy astonishment, that neither pathological anatomy, nor the pathology of the brain have in the least contributed to discover the true fundamental powers of the mind, and how then

could it be posssible from such means, to conceive the idea of particular organs, and their particular seats in the brain?

Of the Mutilations of the Brain as a Means of determining the Fundamental Qualities and Faculties, and the Seat of their Organs.

It is a subject of constant observation, that, in order to discover the functions of the different parts of the body, anatomists and physiologists have always been rather disposed to employ manual means, than to accumulate a great number of physiological and pathological facts, to combine these facts, to reiterate them, or to await their repetition in case of need, and to draw slowly and successively the proper consequences from them, and not to announce their discoveries but with a wise reserve. This method, at present the favorite one with our investigating physiologists, is imposing from its materiality, and it gains the approbation of most men, by its promptitude and its apparent results.

But it has also been constantly observed, that what has appeared to have been incontestably proved by the mutilator A, either did not succeed with the mutilator B, or, that he had partly found in the same experiments, all the proofs necessary to refute the conclusions of his predecessor. It is but too notorious, that similar violent experiments have become the scandal of the academicians, who, seduced by the attraction of ingenious operations, have applauded with as much enthusiasm as fickleness, the pretended glorious discoveries of their candidates.

But besides, these cruel experiments, when they are made on animals of an order comparatively low, are hardly ever conclusive for man. In chickens, pigeons, rabbits, guinea pigs, and even in newly-born animals of a superior order, the whole animal life is

not by any means under the dominion of the brain. I am willing to admit that some results can be obtained, in most cases however, extremely doubtful; even in relation to the phenomena of irritability, sensibility, the functions of the viscera, those of voluntary motion, respiration, &c.; but never will I grant to the physiologists, that the lesions and the mutilations of the brain, either designedly or accidentally occasioned, are the means, the only means, of enabling us to become acquainted with the functions of its constituent parts.

In order that experiments of this kind should be able to throw light on the functions of each of the cerebral parts, it would require a concurrence of many conditions, impossible to be fulfilled. It would first require that we should be enabled to restrain all the effect of the lesion, to that portion only on which the experiment is performed; for, if excitement, hemorrhage, inflammation, &c., affect other parts still, what can we conclude? and how can we prevent these inconveniences, in mutilations, either artificial or accidental?

To be assured that we have entirely destroyed an organ, it would be requisite that we should know beforehand, wtih exactness, all its extent and its sources. But who, up to the time of our discoveries, has had the slightest knowledge of the direction of the different nervous fasciculi, which form the convolutions? Who has had the least idea of the different origins of these fasciculi, and of the multiplied points of their reunions? We are accustomed to make horizontal sections; but never can we remove an entire organ by these sections; for, except in cases of complete hydrocephalus, the nervous fibrillæ of the convolutions are not ramified on a horizontal plane; on the contrary, they plunge diagonally, or perpendicularly, or obliquely, towards their sources of supply, and their original points of origin. Thus, how can we destroy any organ whatever, without at the same time injuring those that are in contact with it, without pene-

trating deeply into the brain, and without causing the death of the animal?

It would be necessary, that we should be able to make an animal, whose brain has been wounded and mutilated, who is filled with fear and suffering, disposed to manifest the instincts, propensities, and faculties, the organs of which could not have been injured or destroyed. But, captivity alone is sufficient to stifle the instinct of most animals. The elephant no longer thinks of copulation; the nightingale, even in the midst of his amours, ceases to sing.

It would be necessary, that, while injuring or destroying some particular portion of the brain, we should be able to confine the injury to the *animal* function of the part affected, that is to say, the instinct, the propensity, the faculty which depends on this, and in no way interfere with the *vital* functions of the brain; for when, after a concussion, blow, cut, &c., there supervenes an inflammation, a benumbing paralysis, vertigo, delirium, mania, or convulsions, how, with this derangement of the *vital* functions of the brain, can the animal functions of any of these functions continue to be manifested?

In similar violent experiments, it would be necessary to destroy the same organs, as completely in one of the hemispheres, as in the other. But thus far none of the physiologists, who have undertaken these mutilations, have taken into consideration the circumstance, that all the organs of the brain are in pairs; and that each hemisphere contains organs precisely similar.

Finally, and especially, it would have been requisite to know what could be found, and what ought to be sought for, in the brain. It would also have been necessary, that the mutilators should be divested of every metaphysical prejudice; that they should have a detailed knowledge of the fundamental powers. Where is the physiologist, where, the anatomist, who has been able to follow this direction, and who has not wished to find generalities and abstractions?

These remarks will be sufficient to prove, that those mutilations, which Sir E. Home has lately proposed, and would make us believe were his own invention, and which are always cried up anew, can never lead to the discovery of the special function of any part of the brain whatever. What shall we think then of those pretended learned people, who contemptuously protest against the proofs of all kinds, which I give of such or such a fundamental quality or faculty, and of the seat of its organ, for the reason, which according to them is very plausible, that these proofs are not founded on similar mutilations and on the derangements which have resulted from them?

I shall proceed to demonstrate immediately, that there exist in the different species of animals, *natural* mutilations of the brain, according as these animals are more or less removed from man, and we shall see what valuable advantages the naturalist can derive from the comparison of these fragments of the human brain.

Can Comparative Anatomy and Physiology at present serve as Means for discovering the Fundamental Moral and Intellectual Powers, and the Seat of their Organs?

When it was maintained, that man had the largest brain, and that this was the cause of his superiority over other animals; when it was maintained, that the angles of the facial line of Camper indicated the degree of intelligence of man and animals, the comparative anatomy and physiology of the brain was made use of. I have proved the inefficiency of these two means. There were indeed some authors, such as Herder, Bonnet, George-le-Roi, &c., who had caught a glimpse of the utility of similar researches; but these have not been practically followed out, and they cannot be so yet with the most ordinary success.

In accordance with their principles, philosophers opposed the instinct of animals to the understanding and will of man. The instinct, as a personified power, was regarded as performing the vicarious office of the mind, the understanding, and the will equally personified. As all the propensities, sentiments, and talents were regarded as modifications of the activity of the mind, so also all the mechanical aptitudes of animals, all their propensities and interior impulses were modified operations of instinct. Both in man and animals, all investigations ended in these generalities; all reciprocal relations were denied; a complete line of demarcation was established between man and animals, and no connexion could be tolerated between them. To believe that animals partook of certain propensities and faculties in common with us, was a heresy. Their different instincts were no more specified or distinguished from each other, than the qualities and faculties of man. It was the part of materialism, to find an analogy between the propensity for propagation in man, love for his offspring, local memory, &c., and the instinct of propagation, the love of progeny, and the local memory of animals. It is because a man *wills*, that he kills, that he defends his property, that he builds, that he sings; it is from instinct, that the animal kills, that he defends his property, constructs, sings, travels, &c.; hence it follows that there is no comparative physiology of the moral and intellectual powers, and hence there is no comparative anatomy of the brain.

What shall be said to this kind of reasoning, when it is founded on the authority of those, who have the most cultivated comparative anatomy? Cuvier expresssly says, that instinct has no visible mark in the conformation of the animal.* By and by I shall have occasion to do justice to this decision, which is falsified in every animal, from the humming-bird to the

* Animal kingdom.

cassowary, from the mouse to the elephant; a farther proof that physiology ought to precede anatomy.

So long as this comparative physiolgy shall fail or be defective, comparative anatomy will be subject to insurmountable difficulties. Let us suppose, that an animal, the dog for instance, has many faculties and consequently many organs in common with us, such as the instinct for propagation, the love of offspring, of attachment, of a local sense, &c., it is evident, in the first place, that these organs will be otherwise modified in the dog, than in man; in the second place, as the dog wants many organs with which man is endowed, there ought to result in the animal an entire form of the brain, very different from the entire form of the human brain. The situation of the organs must necessarily undergo variations very difficult to ascertain. Organs, which in man are placed near the middle of the forehead, are also similarly situated in the dog; but, as the organs which in man occupy the external lateral of the forehead, are wanting in the dog, they are placed last at the side, close by the temples, as I shall demonstrate, for the organs of the senses of the relations of space.

This difficulty would not be so great, if nature had created only a small number of species of animals, so that in each species the gradual perfectibility would be effected by the addition of one new organ to the others; in this case, the organology being once known in man, the interpretation of less complex brains would become very easy. But, in this multitude of species, nature has made distributions and mixtures of organs almost infinitely various: here is an animal where the organ of love of offspring is contiguous to the organ of the instinct for propagation; there, the organ of the love of offspring is entirely wanting, and that for propagation is immediately in contact with another, which altogether changes the form of the brain and the head; here the organ of the sense of locality, is contiguous to the organ of

construction; there the organ of music is placed between these two; and so on.

The further an animal is removed from man as it respects his qualities and faculties, the more difficult will be the interpretation of his brain. Such a head will be in part composed of organs entirely different from those of man: and how is it possible to have an idea of a propensity or a faculty, that it is impossible for us to feel? Nevertheless the same brains will present an analogy in those parts, the functions of which are analogous to those of man.

In general, the nearer the species approaches man, as it respects the qualities and faculties, the easier will the interpretation of his brain become to the physiologist, who, by long experience, has learnt to interpret the brain of man.

My readers will now perceive that, in order to derive all the advantage possible from comparative anatomy and physiology, the study of a great number of brains is indispensable; but this study can never be made in dissecting and examining one brain to-day, and another to-morrow. Neither memory, nor the most scrupulous attention, will suffice to retain all the parts and all their forms, in order to be able to compare them with the parts and the forms of another brain. On this account I have commenced making a collection of brains, partly in plaster and partly in wax; but the expense of a similar collection, even should it be incomplete, generally exceeds the fortune of an individual. Brains, preserved in brandy, or in a solution of corrosive sublimate, lose much of their form, and are very difficult to handle. Thus we can only hope from time, what indifference and prejudice still refuse us. Since our contemporaries are not disposed to admit the importance of this kind of research, we must resign the imperfections of the physiology of the brain to those after us who will have the taste and the courage to continue, what, without contradiction, was infinitely more difficult to commence.

Now I shall undertake to show, how I have overcome a great part of the difficulties of which I have just spoken, and I shall explain the means which have the most assisted me in my researches after the fundamental qualities and faculties, and the seat of their organs.

Exposition of the most convenient Means for determining the Fundamental Qualities and Faculties, and the Seat of their Organs.

I had hardly obtained certain indications of other moral and intellectual powers, than those professed by the philosophers, when I perceived the necessity of directing all my researches, in the first place, towards the discovery and the determination of the instincts, the propensities, and the positive talents; being convinced that for these only organs exist, and seats can be determined.

I constantly said to my friends, indicate to me the fundamental powers of the mind, and I will find the organ and the seat of each. I have experienced many more difficulties in endeavouring to resolve the first problem, than the second; although for this I have encountered, as it respects certain qualities and faculties really fundamental, obstacles which as yet I have not been able to overcome. But as to the primitive, fundamental, radical powers, I know the organ of many modes of manifestation, without being able to reduce them to their fundamental power. There also exist qualities and faculties, upon which I am not yet able to pronounce whether they are simple fundamental powers (*sui generis*), or whether they should be considered as simple modifications of certain primitive qualities or faculties, or, as a mixed result of the simultaneous influence of many fundamental powers.

The important search always is for these independent powers, for, it is only for them, that organs exist in the brain. But where shall we derive this knowledge? Wherever we inquire, we get this common answer: "What need have you of seeking other faculties of the mind than intelligence and will? Man is an architect, mathematician, poet, solely because he has applied his understanding to architecture, mathematics, and poetry. He gives himself to love, he takes care of his children; he robs, he is ambitious, because such is his choice." I had in vain to ask, why it was that such an one applied himself by choice to architecture, rather than to any thing else; why another took pleasure in robbing, in places of honor, &c.

In order to invalidate this unsatisfactory appeal to the will and the understanding, I referred them to the mole, the rabbit, the ant, who construct their subterranean galleries, with astonishing foresight; I referred them to the beaver, the bee, the penduline, who construct their cabins, their hives, and their nests, with inimitable art; I referred them to the quail, the cuckoo, the stork, and the swallow, who, after a long absence, return to their old habitation; I referred them to the blood-thirsty weasel, the cunning fox, the bold wild boar, the singing nightingale, and the imitating mockbird. But still my ears resounded with the cry of the philosophers, *it is instinct;* and one would have believed, that all the means for explaining these phenomena, had been exhausted.

What should I do in this uncertainty? I regarded then as very precarious all that, up to that time, was known concerning the moral and intellectual part of man, because the generally received ideas were in contradiction with nature. I did what I engaged my adversaries to do, I gave myself entirely up to observation, awaiting, with patience and resignation, the results that it would afford me. I have confined myself to the collection of facts, and the noting of the

circumstances under which I observed them. I have been careful in my wishes to explain observations, for fear of misleading my judgment rather by the sagacity of my mind, than of instructing myself by the faithful image of reality.

The facts on which I have founded my assertions are mostly of such a nature, that they can be repeated and multiplied voluntarily by each of my readers. I have not desired to seek in another hemisphere that which could be found at home. The duck and the bull are organized by the same laws as the flamingo and the cameleopard. If we examine with the same attention the crania of Germans, Frenchmen, Russians, Italians, &c., with which we scrutinize the most minute circumstances in the crania of the Caribs, the Becherais, the Hottentots, the Tongouses, &c., we shall have less trouble in multiplying observations, and, as they will acquire a more durable value, they will lead also to more useful results.

The numerous facts that I bring to the support of each fundamental power and the seat of its organ, prove how thoroughly I am convinced of the necessity of multiplying experiments. But these facts will, at most, serve to gratify curiosity, if I confine myself to the consideration of each separately, instead of comparing them with each other, and endeavouring to separate that which is accidental and particular from that which is essential and general, in order to deduce from them laws and truths that are constant. He who contents himself with single facts, as it has been too much established in principle to do, may increase the number to infinity, without deriving any fruit from his labor. He cannot, by so doing be in the least enabled to foresee or produce analogous facts. Not distinguishing the essential from the accidental, he will for ever remain as much a stranger to all that he has not yet seen, as he who enters for the first time on the field of nature; he will be constantly groping in his science; he will never see the whole, which it is only

possible to seize by the connexion of individual facts; and never will be enabled to create a philosophical idea of his object, in order to arrive at new views or to a true discovery.

There exists a sect of philosophers who pretend that individual facts, however numerous, can never lead to general laws; because we can never observe all the facts possible. It is on this account that philosophers in the possession of their abstract and general ideas, boast of being infinitely above the common observer. They suppose, then, that nature does not act consecutively, and by laws constantly the same; they assign to each fact a separate cause. If then the justice of principles is to be doubted, because they have not been derived from a great number of individual facts, what will become of all human knowledge? Whence have the natural philosopher, the chemist, the physician, derived their principles?

It requires, it is true, much sagacity, much circumspection, and a profound knowledged of nature, to discern the phenomena which enable us to deduce the laws, in consequence of which they exist. Almost always this requires many facts, observed under varied circumstances. This is the reason why, when I have only a few facts in favor of a proposition, that I am careful to say: *I have often seen that; I have always seen that; I have never seen that differently;* similar expressions surprise a reader prone to adopt precipitate opinions.

But a principle merits all our confidence, when it enables us to prognosticate phenomena with correctness, or even to cause them to take place, and to foresee, precisely, the necessary results from the circumstances, as well as to determine the circumstances from the results. When one pursues researches with perseverance, when one is sufficiently fortunate to be able to continue his observations during twenty, thirty, or forty years; under the most varied relations, upon educated people as well as upon the ignorant, on the

rich as well as on the poor, to repeat them in a thousand different ways among the most dissimilar nations, and find them always confirmed; when he carries back his observations to the most ancient times, and when he studies the busts, the portraits, the engravings of men who have immortalized themselves by eminent qualities or faculties; when he has studied the biography of these men, and followed them from their youth to their death; when he has made himself acquainted with the means that have favored their development; and when in all this he never finds exceptions, and never meets with contradiction, he may confidently expect that he is on the sure way of truth. The transcendental or speculative philosophers have always excited a smile in me, when I have heard them say, in order to manifest their contempt for the physiology of the brain, that experiments and facts have only a subjective value; that the observer merits, at most, the name of being curious; that I am always right as it respects experience, but, in a philosophical point of view, I am always wrong; does not that signify that their *soi-disant* philosophy of nature, is in direct opposition to reality?

First Method, derived from common Language, to attain to the Knowledge of the Fundamental Qualities and Faculties, and the Discovery of the Seat of their Organs.

In conformity with the ideas, of which I have given my readers a foretaste at the commencement of the first volume, I shall at first solely adhere to the manner, in which the different propensities, sentiments, and talents of men and animals are habitually named. I have always thought that this language was a creation of the faculties of man, and that he did nothing more than express by sounds, whatever took place within him. We always hear men of great talents,

of marked characters, spoken of nearly in these terms: Such an one is born a musician, poet; he has an innate talent for mathematics; he has a passion for constructing, for travelling; he is strongly given to women; he has an insatiable ambition; he is revoltingly proud; he is excessively obstinate, &c. Do not these forms of expression suppose, that these qualifications delineate with precision the prominent traits of the character?

It was individuals, endowed with one or the other of these qualities or faculties, that I set myself to observe. When I was convinced that an eminent talent, or a strong propensity, was really the work of nature, I examined the form of the head of the individual, and had it strongly impressed on my memory.

In the introduction to the first volume, I have related how it was that I was enabled to ascertain those among my school-fellows, who possessed a great facility of learning by heart. I ought then to have been able to have known, that the particular qualities and faculties are not a consequence of the entire form of the brain, and that, consequently, they are not manifested by a general form of head; but the number of observations, that I had made up to that time, was not sufficiently large to establish my ideas. It was a matter of course, that I fell into errors, palpable mistakes; but it was not very difficult to get rid of them, in order to regain the correct way. For instance, I had accidentally observed, that, in some musical composers of great reputation, the superior part of the forehead was compressed by the sides, whilst the inferior part, immediately above the external border of the eyes, was very broad. Perhaps, said I to myself, this triangular form of forehead is the sign of a great musical talent.

But I soon found great musicians equally renowned who had the top of the forehead very broad. This observation enabled me to perceive, that I had not yet found the external mark of the musical talent. My friends were quite disposed to console me for this

folly; the exceptions, said they, prove the rule. I never was of this opinion; a student of nature from my infancy, I could not suppose that there was any thing indeterminate or vague in her works; her laws ought to be immutable and fixed; and every exception, bearing upon an essential point, was a proof to me that the seat of an organ had not yet been ascertained. This severity towards myself determined me to continue my researches, and multiply observations, until I should be enabled to find a constant and common sign; as for instance, in all the great musicians that I had opportunity successively to see. It would have been impossible for me to make similar discoveries in a less extensive sphere, and in a less populous city, or one less frequented by strangers of distinguished talents. The more my observations multiplied, the more was it probable that I was on the point of succeeding, in determining a fundamental faculty or talent, and in indicating, with exactness, the seat of its organ. Happily, my first researches were directed to those talents and qualities, which, so frequently occurring, drew my attention towards them. I have pursued the same method in discovering the talent for mathematics, construction, colors, &c.

Persons who were not at all familiar with the uniformity of the laws of nature, have sometimes objected to me, that what was true at Vienna, might be false, or, suffer great modifications at Paris, or London, &c. Such a supposition has never embarrassed me.

But there is another remark which it is proper to make to young naturalists. We ought not to expect to find in all individuals, endowed with a given quality or faculty, that the organ which corresponds to it is developed in a remarkable degree. Few people know the different degrees and the greatest possible energy of the qualities and faculties; those who have been brought up, secluded in the paternal mansion, know them the least. It is necessary to have had frequent

opportunities of comparing one's self with others, to judge correctly of the point on the scale, where one is placed himself, in this respect. The man of mediocrity places the extreme limit at a point, beyond which the man of genius passes, at his very entrance in the career. That which genius, in its innate capacity, in itself hardly perceives, appears to the man of moderate capacity, exaggerated, fantastic, unnatural, mad, inconceivable. We ought then, to be on our guard, and only choose for the subject of our observations, those men whose eminent quality or faculty is generally acknowledged, and well proved by their deeds or productions.

In the second place, and this remark is as correct as the former, we shall not be fortunate in our researches, except when we choose for subjects of our observations, individuals, who only enjoy, in an elevated degree, one single quality or faculty, and who, as it respects the rest, are ordinary men, or even below mediocrity. In these individuals, the distinguishing organ is exposed by itself, is more strongly developed; and even if one has only seen twenty similar individuals, he must have necessarily acquired very little tact not to be able to distinguish, on some part of the head, a prominence which is the same in all. If, on the contrary, we select individuals endowed with many marked qualities or faculties, we shall be embarrassed, in consequence of many well defined developments presenting themselves. There is a further difficulty, when the organs of well-marked faculties or qualities are placed by the side of each other, the prominences of each organ in particular are effaced, and a collective eminence arises, which is rounded. Hence it happens, that, from the inspection of the head of a man of very distinguished talents, the beginner will not perceive any thing very remarkable, because he does not distinguish any single well pronounced prominence, whilst the experienced observer will not be led into error. It is much easier to distin-

guish the organ of music, the sense of the relations of space, of poetry, in men in other respects of limited capacity, than in those who possess a certain combination of talents.

Second Method; Counter Proof.

Nothing has been easier for me, than to find a counter proof for controlling a fundamental power and the seat of its organ. I examined individuals who possessed in a very moderate degree, the quality or the faculty that engaged my attention; people, for instance, who had not only a very feeble talent for music, but even an antipathy for this science. When, in the same region, where, in those who excelled in music, there existed a considerable development of the brain, I could not find in others any prominence, but on the contrary, a plane surface, or even a depression; when I constantly found this conformation, it served to confirm the idea that I had adopted. We much more frequently find subjects, who aid us rather by the counter proof, than by the positive proof, if not by the almost entire want of development of organs, at least by their inconsiderable development; for, heads of mediocrity are as frequent, as those of genius are rare; besides, notwithstanding the numerous talents with which a man may be endowed, he is always weak in some particulars; and such a subject may sometimes be useful for the positive proof; sometimes, for the counter proof.

Third Method derived from the particular Conformation of the Head of the Individual.

When I discovered on the head of a person a protuberance, produced by the development of one part of the brain, I attempted to learn in what respect this individual was endowed with some eminent faculty or quality. But, in order successfully to make

such an inquiry, much prudence and practice were necessary; for, our friends and our enemies estimate our qualities and talents very differently. There are cases, also, where a talent or a disposition, with which we are endowed in a very high degree, has never had an opportunity of manifesting itself. Oftener still, and this happens especially with the common people, an individual has exhibited the most unequivocal proofs of some particular faculty or propensity, without his having observed, that the least difference exists between him and other individuals of his class, until finally chance discovers it to him.

I have, in society, made use of many expedients, in endeavouring to know the talents and the inclinations of people. I converse, for example, on different subjects. In ordinary conversation, we generally engage in those subjects, which have little or no connexion with our faculties or our dispositions. But when the interlocutor touches upon one of our favorite subjects, we take at once a lively interest. Where is the man, who does not love to display all the activity of his mind, when he finds himself within his own sphere?

The occupations, by which we get our living, generally prove nothing, either in relation to our faculties or our ruling propensities. Sovereigns and fathers make their subjects or sons, generals, magistrates, advocates, physicians, architects, painters, &c. But the occupations to which we resort for recreation, are almost always in conformity with our talents and our tastes.

When an individual has devoted himself to a particular pursuit in spite of all obstacles, and has acquired in it a certain power, he is certain that he has followed his vocation; that is to say, that he has obeyed the impulse of his innate faculties and propensities.

Do you wish to ascertain the character of a person without running the risk of being deceived, even though he should be advised of your intention, and put on his guard? Lead him to talk of his infan-

cy and early yuoth; ask him to relate his school-boy tricks, his conduct to his parents, his brothers, and sisters, his relations, and comrades, and the emulation with which he was animated; make him tell you the history of his friendships with certain children, and of the hatred he felt for others; question him on his plays, &c. It will rarely happen that he will dissemble in these particulars; no one can doubt, that he has to do with a man who knows perfectly well, that the character remains at bottom the same, however the objects which interest us change with age and the social relations. When, besides this, I farther observe what a person sets a value on, or despises, praises, or excuses; what events interest him; what society he seeks; if I see him act especially on occasions where there are conflicting interests; if he is an author, and I read his book, &c., the whole man is unmasked before me.

When once I have discovered the dominant faculty or inclination, I still make use of the two former methods.

I thus run through families, schools, asylums for orphans, foundling hospitals, houses of correction; and I particularly observe, wherever I find those subjects that are distinguished by some innate propensity, or by a particular conformation of the head; I compare them all with each other, always with the view of collecting new facts and proofs, in support of the reality of a fundamental quality or faculty, and of the seat of its organ.

Fourth Method; Collection of Heads cast in Plaster.

We are not at all times equally well disposed to discover the characteristic marks of a head; neither have we at our disposal, living people, whenever we would wish to renew our researches or enlighten our doubts. Often it is impossible to collect together a great num-

ber of individuals, endowed in a high degree with the same faculty, in order to compare them with each other. These difficulties induced me to make a considerable collection of casts. Whenever I became acquainted with any one, who possessed in an eminent degree any quality or faculty whatever, I took a cast of his head. In order to have the entire form of it, I shaved off the hair, to which many willingly submitted, or, I obtained precisely the external configuration of the head by feeling and measuring. In a few years I thus formed a collection of four hundred casts, of men of all conditions and classes, from the beggar to the prince; the deaf and the dumb; idiots, children of all ages, boys, girls, women, &c. I laid schools, houses of correction, hospitals for the insane, all of them under contributions for this object. I possessed those casts of individuals whose qualities and faculties I had already observed; in this number, there were found persons of the poorest education, as well as those educated with the greatest care.

I placed side by side all the casts of individuals in which I had observed a prominent quality or faculty. If the external sign of it was already known to me, I carefully observed if it existed in all these heads. When I had still to look for the organ, the problem was, certainly, much more difficult; in this case I observed the following principles, viz., heads which coincide in respect to a single marked quality or faculty, ought also to coincide with the form of the cranium in a certain place; in consequence of this I ran over all the regions of my heads, I compared them all; and when I pereceived a marked difference of the form in the same region, I abandoned this region. It is necessary for every one to observe for himself, to know how many times it is requisite to resume his researches, in order to be able to find what is common in all these heads. Often I left on my table, for whole months, from ten to twenty of my casts; I examined them daily at different moments, and in the

most different dispositions of mind, until, finally, I was struck, and sometimes at the moment when I least expected it, with the protuberance common to them. It is very natural that it should be so; to-day one discards such a pretended sign that he has just ascertained to be false, and to-morrow, another. Thus, one says to himself from day to day, it is not this, it is not that, neither is it this, and when, finally, all the characters ascertained to be false, have been set aside, the true one appears of itself.

When in this manner we have discovered in ten or twenty heads, a common character, we return with increased ardor to the methods above indicated. These casts of living people are of the greatest assistance. By their means we become familiar with all the forms of the head; it has often happened to me to discover on them prominences which certainly were formed by the brain, but which until then I had not perceived, and at that instant, even, I commenced their study, to discover their signification.

Fifth Method; Collection of Human Crania.

As in my researches I had not cranioscopy for my object, but the discovery of the functions of the integral parts of the brain, it was my aim to learn the form, as exactly as the seat, of each organ; but, in the heads of living subjects, the muscles, the skin, and the hair are sometimes so thick, that it becomes very difficult to judge with precision, of the protuberances of the cranium. Some regions, such, for instance, as the base, are neither susceptible of being seen nor felt.

This imposed upon me the necessity of making a collection of crania; but how could I procure them? By so doing every body is shocked. Supposing even that we could collect some in the hospitals, in the institutions for the insane, in the houses of correc-

tion, it would rarely happen, that we could obtain exact accounts of the biography of such objects; and how rarely do we find physicians sufficiently accommodating to assist a kind of researches, to which most of them attach no value? With perseverance, and by means of the facilities with which an enlightened minister favored me, I was enabled to form a collection of the crania of very remarkable men. Many persons, whose heads I had moulded, died; I compared their crania with the cast of the living head, and I rectified my ideas of the situation and the form of organs, as well in the brain as in the cranium. At the same time I observed the difference that takes place in the form of the organs, from the living to the dead subject. Finally, this collection was the occasion of numerous researches that I made, on the brains of idiots, of maniacs, of subjects attacked with every kind of mental disease, researches which led me to make invaluable discoveries in diseases of this kind. It is thus that my collection of crania, which is a bugbear in the eyes of the vulgar, becomes the source of the most useful and important discoveries.

It is probable that, for a long time, no naturalist will be able to form a collection as rich as mine; for there is little hope, that men will ever be able to overcome the difficulties with which a similar undertaking is attended. But this ought not to discourage any one; a collection of casts, made with discrimination and judgment, will be sufficient. Let the head of the dead body be shaved, and plaster be applied over the whole head, so as to form a hollow mould in two or three pieces, and a most exact cast can be obtained from this mould. Many families submit willingly to this operation, and the more readily, as it is the most infallible method of transmitting to posterity a bust of the deceased person, having a perfect likeness. If our ancestors had thus moulded the heads of great men, what a treasure for the observing philosopher would

they have transmitted! Unfortunately, we possess but very few correct busts. When the artist composes, he is allowed to obey exclusively the rules of art; but when he is engaged to trasmit to posterity the portraits of men who have lived, he is obliged servilely to copy nature: in such cases, to wish to idealize his model, is to disfigure nature. But, unfortunately, artists, instead of rendering homage to truth, allow themselves to be still subjugated by the imaginary rules of art, and the pretended laws of the beautiful. They are too proud to mould heads, and simply execute a mask; and yet it is certain, that so long as they will not resolve on this course, we shall have either imperfect or false imitations; and two busts of the same man, coming from the hands of different artists will always differ. I observe still that the greatest artists, painters, designers, and sculptors, when they meet with uncommon forms, and which appear to them disagreeable, consider them as defects, as errors of nature, and believe that they ought to modify the proportions. And yet usually these uncommon forms, which offend the eye, are precisely the expression of the moral and intellectual character.

Observations on the aforesaid Methods, of discovering the Fundamental Faculties and Qualities, and the Seat of their Organs.

All the methods above indicated suppose, that the favorable development of an organ, always proves the possibility of the favorable manifestation of a quality or faculty. As I have, in a very detailed manner, proved in many places of this work, that this is really the case, I deem it superfluous to advert again to this subject.

Although the means in question have constantly cleared the way for the discovery of the fundamental qualities or faculties, they have not always been

sufficient however to distinguish the radical power from its simple products. To what fundamental power should we refer architecture, sculpture, painting, design, mechanical dexterity? Or are the phenomena, that we regard as simple, different modes of one and the same radical power, effected by as many particular organs? I have been obliged, as already stated, to make my first researches upon men endowed with very eminent qualities or faculties; consequently, on subjects in whom the organs had the maximum of the manifestation of their activity; but this activity is often so far removed from being essentially the fundamental power, that it requires a good deal of sagacity to distinguish the one from the other. And still I found myself obliged to give to this kind of manifestation, which usually accompanies the uncommon development of an organ, a name which should designate it with precision. Thus, for example, it is unquestionable, that the excessive activity of a certain organ manifests a propensity to rob, and that of another organ, a propensity to kill. I was then obliged to name these organs after this kind of activity. In the main, I was right, since these propensities result from this given degree of development of these organs; but, at this period, I had not extended my observations sufficiently far, to be able to assume such a point of view, as to regard this excessive action of the organs as a gradation of the manifestation of a fundamental quality. It was not until long after this, that I was enabled to resolve these difficulties; and if I have succeeded in it, it is as much by reasoning, as by observation. Thus, in certain cases, opinions will always remain divided, on the question of knowing what ought to be the denomination of the fundamental quality or faculty, which we only perceive, in a very energetic mode of its action, as being the consequence of an extraordinary development or activity of its organ.

Means of discovering the Fundamental Qualities and Faculties, or the Fundamental Powers of the Mind, as well as their Seat. Continuation.

The following methods have assisted me less in discovering the fundamental qualities and faculties, than, in proving their discovery.

Sixth Method.

I had made it a practice, for a long time, to mark on crania the form and situation of the organs, as fast as I discovered them, when I began to examine how far these places on the cranium, corresponded with the subjacent cerebral parts. Let any one imagine my joy and astonishment, when I observed, that the form of each of these external marks that I had discovered, must necessarily be such as it is, on account of the cerebral parts underneath; the last being first formed. When the protuberance is a segment of a sphere, it covers convolutions that are spirally rolled upon each other, as in the organ of construction; when the external sign is conical or pyramidal, there are conical or pyramidal convolutions underneath, which give rise to it, as the organ of the relations of sounds. Sometimes the external mark is simple, and sometimes it is double; in each case, according as the congenerous organs of the two hemispheres are near or distant from each other, of which the organ of the love of offspring is an instance. The same thing takes place relative to the direction of the organs, whether they are perpendicular, horizontal, oblique, from before backwards, or from above downwards.

We always attentively examined if the elevated, prominent, and broad places of the cranium, corresponded to cerebral parts that were ample, wide, and developed. We have never found exceptions in sound brains, and in those of subjects of middle age. When the forehead is low, and contracted, the

convolutions which it covers are always small, indicating moderate intellectual faculties. The contrary takes place when the forehead is high, wide, and projecting. In all cases where the sentiments, propensities, and instincts predominate over the superior intellectual faculties, the posterior part of the head is largest, as in animals and in persons, that are very sensual but of limited intellect, and the convolutions that are placed there, have acquired the greatest development of convolutions in the brain. (Pl. VIII. and IX.)

In cases where any faculty or quality was manifested with much energy, we found the cerebral parts, situated under the mark, much more developed and prominent, than in the neighbouring parts.

My readers will recollect the changes that the brain undergoes in the different ages. I have proved that the cranium changes form gradually, as the cerebral parts successively develope themselves or decay. The two sexes, sometimes having the frontal parts, sometimes the superior occipital parts of the cranium more prominent, evidently manifest in the same regions cerebral parts more developed, or more elongated: but I shall go more into detail on this subject, in the treatise on the particular fundamental powers. It remains constantly certain, that the largest, the most prominent parts of the cranium indicate in the individual convolutions the most developed, and cerebral parts the most active.

Seventh Method; comparative Anatomy and Physiology; natural Mutilations of the Brains of Animals.

I have demonstrated above, that the comparative anatomy of the brain of man, and the different species of animals, could not be attended with any happy result in the discovery of the fundamental powers of the mind and the seat of their organs, so long as anatomists were not directed in their researches by

the previous determination of the instincts, propensities, sentiments, and talents of man. But this knowledge, once acquired and applied to animals, becomes an inexhaustible source of instruction, and the most irresistible proof, if the fundamental qualities and faculties, and the external marks of their organs have been determined in harmony with the laws of the whole animal kingdom.

The origin of the mechanical aptitudes, instincts, the inclinations, and the faculties of animals, and the essential difference of these powers, are by no means subject to so many doubts, as the origin and the essential difference of the moral qualities and the faculties of man. It is almost generally admitted, that in animals every thing is innate. To know then their different instincts, their different propensities and faculties, would be to know their fundamental powers; and the same analagous powers in man would be considered equally as his fundamental powers.

However, except two organs, I have not made any discovery of this kind in animals, although from my earliest youth I have had a great number constantly under my eyes. I have seen dogs that were good, bad, affectionate, cross, courageous, and cowardly, some endowed with an astonishing local memory, and others, getting lost every where; I have seen rabbits, sows, cows, cats, both good and bad mothers; birds that were docile and indocile, singing birds, and those that did not sing; sparrow-hawks or little falcons passionately fond of the chase, and others of the same species that could not be taught, &c.; but all this has such a natural appearance, that we hardly reflect on it. It was only the different qualities and faculties of man, especially their extreme feebleness or their extraordinary energy, which impressed me so strongly as to arrest my attention. To have one's attention fixed on these differences, and to be convinced, is almost simultaneous. Hardly had I advanced a few steps in my method of discerning and rectifying the

qualities and faculties of man, before the qualities and faculties of animals opened my eyes at once, and the notions of their habits and manners, that I had collected, became to me a source of the most extensive and frequent use.

Nothing then was more natural than to compare the instincts, the propensities, and the acts of intelligence of animals, with the propensities and the intellectual faculties of man. Every thing which is common to man and animals, said I to myself, ought to be referred to the same law, with the exception of the modifications which arise, in part, from modified organic apparatus, and, in part, from the influence of other qualities or faculties. The same viscera and destined also to the same organic functions; the same senses and occupying the same places in the head, and destined for the same object; then again, the same propensities and the same faculties in man and in this or that species of animals, being found; it must follow, that the same organs and the same seats of these organs, exist in man and in animals.

Here, then, is the first shoot of a system of comparative anatomy and physiology. Natural approximations opened to me a vast field to rectify and confirm the observations, that I had made on man. The more a quality or faculty is common in animals, the more did I acquire the means of multiplying my proofs; because I was enabled to prove, in a greater number of species, the propensity or the fundamental faculty and the seat of its organ.

Very often the approximation of the brain, and especially the propensities and the faculties of animals, towards the brain and the qualities and faculties of man, contributed much to dissipate my doubts and decide my hesitation. The brains of animals are less complicated, their instincts, their propensities, and their faculties are very strongly marked, open, and distinct; their crania, consequently, are more distinct in the species, and even in the individuals, compared with

each other; the external marks of their organs are more isolated, and easier to ascertain. Any one, then, can easily conceive how much the study of comparative anatomy and physiology may afford assistance and assurance to the physiology of the brain.

I never shall forget that I have to combat both the prejudices of philosophers, and the greatest authorities among the naturalists; and this will be an additional inducement in the exposition of organology, to accumulate proofs upon proofs, that the qualities and the faculties of animals have very visible and palpable marks in the conformation of their heads. Neither prejudices nor authorities will succeed for a much longer time in subjecting the instincts, and propensities, and the varied and different intelligences of animals to a single occult imaginary power, nor in withdrawing them from the universal laws of organization.

As those animals which differ much from man, have the organs of vegetable or organic life entirely different from the viscera of men, we may, with probability, presume, that they have also the organs of animal life different from those of man. This explains to us why we observe in animals, phenomena which surpass our understanding, without speaking of what takes place within them, and which our imagination can never reach. In these cases, comparative anatomy and physiology admit of no application to man. Still these same animals may have some points of contact with animals more analogous to the human species, and with man himself, as far as regards the most essential and the most indispensable qualities, such as the instinct of propagation, the love of offspring, the carnivorous instinct, the instinct of construction, of sociability, of self-defence, &c. Insects, fishes, amphibious animals, afford us examples of this. The same qualities are found in birds, many species of which furnish the best proofs of the organ of singing, the carnivorous instinct, the organ of the sense of the re-

lations of space, the organ for the instinct of love of offspring, &c.

Let us now see, if comparative anatomy and physiology do not afford an infinitely more fruitful and more conclusive method of discovering the functions of the cerebral parts, than those violent mutilations so much boasted of and yet so sterile in results. The animals the nearest allied to man are, as it respects animal life, as it respects the moral qualities and the intellectual faculties, but fragments of man. Their brains are deprived of many parts with which the brain of man is endowed. All these brains are, then, natural mutilations in comparison with the human brain. They are farther natural mutilations, in comparing those of one species with those of another. Thus, if we wish to ascertain the seat of the intellectual faculties of man, we may compare the brains of the dog, the horse, the ox, the ape, &c., with that of man; if we have not the brains, we may compare the conformation of their heads, and we shall see that the heads of animals are very slightly elevated: that, for the most part, they recede immediately above the orbits, and that they are flattened; that they never form a vault extending beyond the eyes. On the contrary, observe man, with his forehead elevated three inches above the orbits, and often, arched in front. We shall observe farther, that the more the forehead of the dog, the monkey, the horse, is elevated above the eyes, the more these individuals will partake of some resemblance to human intelligence. Is there now any necessity of extirpating from a man the cerebral parts placed opposite the forehead, or of waiting until an unfortunate accident shall destroy them, in order to learn that these parts of the brain must be considered as the organs of the most elevated of the intellectual qualities of man?

Do you wish to distinguish the organ, which in man inspires the taste and the talent for music? Compare

the head, or rather the external inferior angles of the forehead of a great musician, with the heads of the dog, the ape, the ox, and you will perceive that in these last, the parts of the cranium, and, consequently, the cerebral parts placed underneath it, do not exist. Compare, further, a singing bird, the black bird, the thrush, the nightingale, &c., with the gross-beak or haw-finch, the sparrow, the owl, &c. Compare the male nightingale, the male mocking-bird with their females, and you will soon be convinced, that the heads of the males are more square, more angular, more prominent above the eyes, and that those of the female are constructed conically. Observe the narrow forehead of the dog, the ape, the badger, the horse, in comparison with the square forehead of man, and you will have the solution of the problem, why these animals are neither musicians, nor painters, nor mathematicians, &c. Compare the carnivorous birds and mammalia, with the frugivorous birds and mammalia, and if, in a dozen cases, you are not struck with the constant difference of their heads and their brains; if you do not ascertain which is the cerebral part that causes this difference in the instincts of animals, you are not destined to penetrate the enigmas of nature.

In order advantageously to compare the brains and the crania of animals, with those of man, it is necessary to be familiar with the nervous systems of many species of animals in comparison with that of man. Although all the cerebral organs in man and animals are found precisely in the same place, this rule appears in different species of animals to undergo great exceptions, as I have before remarked. These exceptions are caused by two circumstances. The first is the direction, either hroizontal or perpendicular. In animals where the position is entirely horizontal, as the ox, the cerebellum is very superficially situated behind the posterior lobes of the hemispheres. Not attending to this circumstance, naturalists have pretended that the posterior lobes were wanting in these animals, and

comparative anatomy, so far as the organ of the love of offspring was concerned, was thought to be in fault. In many species of birds, as in hens, turkeys, &c., the cerebellum is entirely isolated behind the brain. The lateral parts of the head contain the organ of hearing, &c.

The second circumstance that might induce us to believe, that the cerebral organs have not the same situation in man as in animals, is, that the brains of animals are deficient in many of the organs peculiar to man. The entire series of human organs is often interrupted. There results from this, as I have also above indicated, entire forms of brains and crania extremely varied.

This circumstance causes, even in some species of animals, an apparent difference in the situation of the nerves of the senses. In man the numerous small inferior convolutions of the brain extend beyond the bulb of the olfactory nerve. (Pl. IX.) In many animals, on the contrary, such as fishes, the amphibia, birds, the ox, (Pl. III.) the sheep, (Pl. IV.) the mole, &c., the bulb of the olfactory nerve is found in front of the anterior inferior convolutions; either because these animals do not have these convolutions at all, or they are very short in them.

But since, on account of the organs that are wanting in these animals, sometimes in one region, sometimes in another, the place of the organs varies in a particular point, how can the naturalist be assured that, for instance, the protuberance at the external border of the forehead is, in such an animal, the organ of the sense of localities, in another that of the sense of sounds, and, finally, in man, that of the sense of numbers? How is it possible, in these cases, to establish the analogy which exists between man and animals, and to find in these last a confirmation of the organs discovered in man.

This is, certainly, a great difficulty for a beginner, but nothing for a practised observer; for, first there

is an opportunity of making a number of comparisons between different species of animals, and between different individuals of the same specise. In the second place, the forms of the organs already ascertained afford us great resources. These forms always remain the same as far as the essential part is concerned, and the expert observer will hardly ever be liable to confound them. If we compare a man, in whom the organ of the sense of localities is strongly developed, with a dog who has also this organ strongly marked, and with a lemming, we shall find in each the same form of organ. If we are still in doubt, we have only to make the comparison with other species of mice, and with dogs, that have the organ of localities feebly developed. This method is applicable to all the organs, so far as it is required to find in animals, confirmations of the organs discovered in man.

Finally: the comparison of the human brain with that of animals, enables us to know, of what integral parts or of what individual organs, the brain of man is composed; where the animal ceases in man; where the noble character commences, which distinguishes him from the brute, and how much he is elevated above brutality; a study much more useful and more positive than the vain reveries of the metaphysicians.

Eighth Method; Accidental Mutilations.

It is true, that I have rejected violent mutilations, as a means of discovering the functions of a cerebral part, or of any organ whatever. The reasons that I have alleged still exist in those cases where an accidental mutilation has disturbed the functions of any faculty or quality whatever. Still, when, after the seat of an organ has been discovered by other means, and this discovery has been sufficiently proved, and this organ having been injured, there ensues any lesion of the faculty that is attributed to it, we may with the fullest assurance, regard this phenomenon as

a new proof. When, for example, the organ, by means of which we possess the faculty of retaining names, has been injured by a bullet, and there follows from this an inability to recollect names; or when the region, where the organ of numbers is situated, becomes painful every time that one makes difficult calculations; when, after a lesion of the organ, already well proved, of the instinct of propagation, there ensues impotence and a disgust for cohabitation, no one will suppose, that it is bad reasoning, to regard these facts as so many new confirmations.

Ninth Method, taken from the Succession and the Arrangement of the Organs.

The physiology of the brain, advanced as it is at present, is an undeniable proof, that the employment of the means above indicated, has been infinitely more useful to science, than all the efforts of the metaphysicians and anatomists, who have not been governed by the spirit of sound philosophy. Now that we know a sufficiently large number of the primitive radical powers and organs, it becomes more and more possible to ascertain the laws according to which nature has disposed them in the brain. These laws have afforded me a new and extremely philosophical means of assuming, in the first place, and then of discovering the seat of the fundamental powers.

Let me explain.

Up to the present time, I have never permitted myself to be influenced by reasoning *a priori*, having early learned how perfidious it is, and of how many plausible errors it is the source. I preferred to abandon myself entirely to observations. The consequence was, that I sometimes discovered one fundamental quality or faculty, sometimes another, sometimes one organ, sometimes another. Whenever I believed that I had determined a primitive or fundamental power,

in whatever degree of activity, and I thought that I had found the seat of its organ, I marked the place of this organ, and designated its form on the cranium. In this way of proceeding, I could follow no other order than that in which I made my observations. I defined, sometimes in one region, sometimes in another, the form of the organ that I had just discovered. Occasionally I had the good fortune to seize at once, both the place and the form of an organ precisely. But sometimes, too, there has been so much vagueness in my first outlines, that I have been obliged to make a greater number of observations, better compared, in order to determine the seat or the form of an organ with more precision. From this has arisen the craniological chart, seized by the public with so much avidity; and since it was the only thing to the purpose which has appeared, it was thought that the whole tendency, and all the merit of the physiology of the brain, were contained in this chart. Artists soon took possession of it, have executed it either well or ill, without ever consulting me, and have published a great number in all sorts of forms. This has determined us to make them more exact either on crania, or on plaster casts.

After I had a thousand times considered this arrangement of organs, I was struck with the following great truths. If the reader has in his hands a head similarly marked, I entreat him to place it before his eyes, and to follow me in my reflections.

1. The qualities and the faculties, which are common to man, and the other animals, have their seat in those cerebral parts, which are equally common to man and brutes. Whenever, then, we are speaking of a quality or faculty common to beasts and man, we should seek its organ in the inferior posterior, the posterior inferior, or the anterior inferior parts of the brain. Of this number for example, are, the instinct of propagation, the love of offspring, the instinct of self-defence, that of providing food, the instinct of cunning, &c.

2. The qualities or faculties which man exclusively enjoys, and which form the barrier by which he is separated from the brute, have their seat in those cerebral parts which are wanting in animals, and we must consequently seek them in the anterior superior, and the superior anterior parts of the forehead. Of this number for example, are comparative sagacity, the metaphysical disposition or causality, wit, the talent for poetry, the disposition to religious sentiments and ideas.

3. The more indispensable the qualities and faculties may be, the more do we find their organs placed near the base of the brain, or towards the median line. The first and the most indispensable of all the organs, that of the instinct of propagation, is placed nearest the base; then comes that of the love of offspring, &c. The organ of the sense of localities is more indispensable than that of the sense of tones, or that of numbers; and hence the two last are placed farther from the median line than the first. Then, the more a quality or a faculty is essential, the more it is necessary to seek its organ near the base of the brain, or the median line. The organs, that are less indispensable, are placed towards the top and sides of the head. If I wished to discover the organ of the talent for poetry, I should not, according to this principle, look for it either at the base, or near the median line of the brain.

4. That the organs of the fundamental qualities and faculties, which mutually aid each other, are also placed near each other; for instance, the organ of propagation and that of the love of offspring, that of self-defence and the carnivorous instinct, that of tones and of numbers. If there exist organs for the senses of order and of the measure of time, it is very probable that they will be found in the neighbourhood of that of the sense of locality, of tones, and of that of the sense of numbers.

5. The organs of the fundamental analogous qualities and faculties are also placed near each other.

For example, the organs of the relations of places, colors, tones, and numbers are placed in the same line, the same as the organs of the superior faculties, and those of the propensities of the inferior animals.

Every one must be struck with the profound wisdom, which is manifested in the arrangement and successive order of the organs. This connexion has appeared to me to be one of the most important proofs of the truth of my discoveries. I challenge all those, who would wish to attribute my determination of the radical powers and the seat of their organs, to caprice, to a destination arbitrarily conceived, to be endowed with the tenth part of the perspicacity necessary to have only the most obscure presentiment of this order which is so admirably combined! But once found, we discover there the hand of God, which we cannot cease to adore with the more astonishment, in proportion as his works are more displayed before our eyes. We easily conceive how these laws, which preside over the arrangement of organs, ought to facilitate new discoveries in the organical part of the physiology of the brain.

After the exposition of the fundamental powers and their organs, I shall treat of gestures, mimicry, and the forms of heads peculiar to different nations. We shall see that the language of gestures, and the form of the head in different nations, compared with the national character, are equally a means not only of confirming the discoveries already made, but also of making new ones.

Before treating of the fundamental qualities and faculties in particular, and of indicating the seat of their organs, it will be useful to tell the reader what I understand by the expressions, *qualities and faculties*, *fundamental*, *primitive*, *radical;* and to give some general notions of the brain and cranium, and on the manner in which we should undertake the investigation of the seat and the form of the organs.

Definition of the idea, Fundamental, Primitive, Radical Qualities, Faculties.

Although I cannot present in all its development my philosophy of the moral and intellectual qualities, instincts, propensities, and sentiments, until after the exposition of all the radical powers at present known, I believe that I have said enough, to enable the reader to recollect the difference, which exists between the general attributes of philosophers, between perception, attention, memory, comparison, judgment, imagination, &c., and the instincts, propensities, sentiments, and the determinate talents. Each of these last belongs to a particular organ, whilst the others are only attributes, modes of activity of the true fundamental powers. The attributes are inseparable from all radical faculties or qualities, whilst these exist by themselves, and constitute a proper, specific function.

It would be well, if we could determine all the fundamental powers, as, for example, the propensity to propagation, the love of offspring. But the ordinary action of the qualities and faculties hardly excites attention; it escapes from us in its primitive destination; we see the different ramifications of the tree, but its root is concealed. So also we are often struck by the modifications, by the different degrees of manifestation of the radical powers; but we have not penetrated to their source, their root. We see the poet, and the external mark of his talent; but this degree of activity is evidently the result of an extraordinary development of one cerebral part. What is the function of this part in its primitive destination? What is its radical fundamental function? The propensity to robbery, to murder, to benevolence, to devotion, are each equally the result of the development and extraordinary action of an organ. But to what radical, primitive, fundamental function should we refer them? Here are great difficulties to overcome. For many

organs we have already succeeded in determining a primitive, radical action; with regard to others, I shall enter upon the discussion of them with my readers, as often as an opportunity offers.

In the mean time, we believe that we can indicate, in the following manner, the characteristic conditions which entitle an instinct, a propensity, a sentiment, a talent, to the appellation of fundamental, primitive, radical.

1. When a quality or faculty, or rather its organ, neither manifests itself, nor is developed, nor decreases, at the same period as others. It is thus that the organ of the propensity for propagation, and the propensity itself, are developed, and usually manifested later than the other propensities. It is thus that the memory of names, is generally impaired sooner than the other faculties.

2. When, in the same individual, a single quality or faculty is more or less active, and its corresponding cerebral part is more or less developed than the other parts. It is thus that the great sculptors, painters, designers, sometimes have not the least disposition for music; and the greatest poets, little talent for mathematics.

3. When a single quality or a single faculty is active, whilst the others are paralyzed, and only the single organ developed, which corresponds to it. It is thus that those who are idiots, in all other respects, are sometimes imperiously affected by physical love, or have a great talent for imitation, &c.

4. When all the other qualities and faculties exist in full force, and all the other organs being sufficiently developed, one single faculty or single quality remains inactive, and one single organ undeveloped. It is thus that certain individuals cannot comprehend that twice two makes four; that others hold music and women in abhorrence.

5. When in mental diseases there is only a single quality or a single faculty that suffers, or there is only

one which remains in its perfect integrity. It is thus that one person is insane in relation to religious ideas, to his pride only, &c.; that another, although mad in all respects, yet gives lessons in music with great correctness.

6. When the same quality or faculty is manifested in a manner totally different in the two sexes of the same species of animals, and the organ in the different sexes is differently developed. It is thus that the love of offspring and its organ are more strongly marked in the females of most animals; it is thus also with singing birds, that the male alone sings, and has this organ well developed.

7. When, finally, the same quality or faculty and the same organ are always found in a particular species, and always are wanting in another species. It is thus that many species of birds, that the dog, the horse, &c., have neither the propensity nor the organ of construction, which are so wonderfully manifested in other species of birds, in the squirrel, in the beaver. It is thus that certain species of animals are carnivorous, emigrate, sing, take care of their young, &c., whilst other species are herbivorous, pass a sedentary life, do not sing, and abandon their offspring.

In all these instances we may admit the quality or the faculty in question to be a fundamental quality or faculty, a primitive, radical power. It is by no means necessary that all these conditions should be united; but the more there are of them, the better the independence, the speciality of the quality, or of the faculty, and the existence of the organ will be proved.

Description of the Brain, of the Head, and the Cranium, so far as the Knowledge of it is necessary for the perfect Understanding of the Seat of the Organs.

Those who possess my large work, with the atlas, will have a much greater facility in understanding the

following descriptions and the indications of the seat of the organs, than those who are deprived of these means. But even those who consult the plates, must not flatter themselves with having an exact idea of the brain and the cranium, without having seen them. Whatever degree of exactness I place in the determination of the seat of the organs, I know by experience, that no one can well instruct himself in this part, without having a cranium, or, what is much better, a marked or purposely designed head, before him.

PLATE IV. represents the inferior surface of the brain, such as it is applied to the base of the cranium. PLATE IX. represents the superior surface of the brain placed in the cranium in its natural situation. PLATE VIII. shows the brain seen in profile, also in its natural situation in the cranium. PLATE XI. represents a vertical section made between the two hemispheres, so that we see the internal surface of the left hemisphere where it touches the right. We make a perpendicular section in commencing with PLATE IV. from 28, 91, *c*, *a*, 22, 25, to PLATE IX. 69, 48.

In all the brains, the organs (or rather the expansion of the organs after they have arrived at the surface of the brain) are marked with Roman figures.

PLATES X. and XII. 38, 38, 38, is the radiated appearance of the medullary fibres, S. S. S., which depart from the commissures (*renfort*) f. p. p. p., to go towards the formation of the nervous membrane of the brain, which forms the folds which we call convolutions.

Now the reader can form to himself a correct idea of the position of the brain in the cranium, of the cranium itself, and of the manner in which the organs appear on its surface. We see distinctly, (Pl. VIII.) that the whole cranium is filled by the cerebral mass; that between the internal surface of the cranium and the brain there are only some membranes to be found, that is to say, the vascular membrane, (*pia-mater*,) the arachnoid membrane, very thin, and a membrane of more consistence, called the *dura-mater*.

The Bones which form the Osseous Box of the Brain.

Sphenoid Bone.

The inferior part of this bone is not a subject of consideration here. It is true, that it is in contact with a small portion of the middle lobes, but we can only discover its form after death. A small portion of this bone is placed against the posterior external part of the orbits, and contributes a little to determine their form. A portion of its alæ touches the posterior border of the frontal bone, as well as the anterior border of the temporal, and the anterior inferior angle of the parietal.

Temporal Bones.

The temporal bones (Pl. XXVIII. VI.) extend from the posterior border of the alæ of the sphenoid bones, to the inferior border of the parietal bones, and even as far as a portion of the anterior and lateral border of the occiptal bone. The temporal bones contain the auditory apparatus. Behind the auditory opening is found the mastoid process; which is filled with cells.

Occipital Bone.

The occiptal commences behind the sphenoid at the base of the brain; it forms the occipital hole, which gives passage to the spinal marrow, and extends downwards and backwards, then ascending, where it joins the posterior edges of the parietal bones. (Pl. XXVIII. I. II.)

Parietal Bones.

These bones (Pl. XXVIII. IX. XIII.) unite in the superior part of the median line; in descending they

extend laterally to the temporal bones, backwards to the occiptal, and forwards to the frontal.

Frontal Bone.

The frontal bone, in ascending, extends from the root of the nose and the superior part of the orbits, to the superior anterior border of the parietal bones, (Pl. XXVIII. *a*, 56, 55, 54, 53, XXVII.) and laterally to the sphenoid bone.*

In books of anatomy, it is true, they describe these bones as having always the same form; but the fact is, that their form differs in different individuals, according as the cerebral parts situated against them have different proportions among themselves. It is precisely this which causes the various forms of heads; varieties of forms, which indicate the different modifications of the moral and intellectual character of individuals.

The crania of animals, as I have before said, require a particular study, not only as it respects the diversity of the species, but also according to the age of the individuals. In some species, we can determine the form of the brain, from an examination of the external surface of the cranium, very nearly in the same manner as in man; in others, on the contrary, the external table of the cranium, either in its whole contour, or in some regions, is so far from being parallel with the internal table, that the external form of the head and cranium, in no way resembles the form of the brain. Hence in these animals, the organologist can arrive at no conclusions, but from the internal surface of the cranium, or the external form of the brain.

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* I make no mention of the ethmoid bone, because, being covered entirely by the bulb of the olfactory nerve, it is not in contact with the brain.

Method of examining the Organs.

It is first necessary to be familiar with the middle, ordinary, or moderate degree of development of the organs. The attentive inspection of a great number of heads, and the study of their ordinary forms, for a long time continued, will gradually procure this knowledge. We can then profit by all occasions for acquiring an exact idea of the extraordinary development of the different cerebral parts, and their prominences on the external surface of the head. We should examine the heads of great poets, mathematicians, mechanics, musicians, travellers, &c. In adhering to these two indispensable precautions, we shall soon remark that the most characteristic organs form neither the bumps of the buffoon anti-organologists, nor salient prominences like an egg or the fist.

The anterior parts of the forehead, bald heads, and crania do not require to be felt; an experienced eye is sufficient to judge of the degree of development of the brain in general, and of certain regions and certain parts in particular. We shall do well by studying, first, the different sizes of heads in general; then, we should endeavour to ascertain the different developments of the frontal region, the occiptal, the lateral, the top of the head, and we should end by studying the subdivisions of all these regions.

When it is required to touch or feel, it is necessary to resort to an expedient, which I have always experienced a difficulty in making my auditors comprehend.

Supposing that the examination of organs requires a very nice touch, they seek them with the ends of the fingers, the fingers being at the same time separated. In this manner we may perceive certain asperities, fissures, little grooves, exostoses, tumors, &c., upon the head; but, in this way, we shall never discover prominences that are slight, large, round, oval, &c., that the

different developments of the cerebral parts produce on the surface of the heads or crania. It is, on the contrary, necessary to join the fingers, and pass and repass their inner surface over the spot or place where we seek the external sign of an organ. We thus augment the points of contact, and in thus gently passing the hand over the head, we easily discover prominences, that even escape the eye.

Most of my auditors, being instructed in this method, detect the organs at the first touch, or the first *coup-d'œil.* But there are some eyes and some hands, so unfortunately served by the brain, that it is impossible for them to be convinced of the reality of the most distinct forms. *Non omnia possumus omnes.*

SECTION III.

EXPOSITION OF THE FUNDAMENTAL POWERS, OR THE PRIMITIVE, RADICAL MORAL QUALITIES AND INTELLECTUAL FACULTIES; THE INSTINCTS, PROPENSITIES, SENTIMENTS, TALENTS, AND OF THE PARTICULAR SEAT OF THEIR ORGANS.

THOSE who call to mind the historical account of my discoveries, will not expect that I should treat of instincts, propensities, sentiments, and faculties in the same order in which I discovered them.

I will try to conform, as much as possible, to the order, that exists in the organization of the human brain. I shall commence with the inferior propensities or faculties; then I shall pass to the qualities and faculties which gradually assume a superior order, and I shall conclude by the most elevated sentiment, — that of rendering homage to the Divinity. This course will conduct us to the only true philosophy, to the detailed knowledge of man, and it will furnish us with luminous solutions of questions of the highest interest.

Instinct of Generation, of Reproduction; Instinct of Propagation, &c.

I commence with that function of the living organization, on which depends the existence and the continuance of the different species of animals. The first and the most universal of all the commands was — *Increase and multiply!* Why then should we use evasions when the most indispensable of all the instincts is concerned, the instinct which governs all the rest, and by the aid of which *l'une des moitiés du règne animal se*

*confond avec l'autre dans les délices d'une inexprimable jouissance.**

Considérons ce penchant avec toute l'attention que mérite sa haute destination; suivons-le, tant dans ses actes réguliers, que dans ses égaremens. Quoique ce sujet, objet des méditations de tant de naturalistes, ait été traité mille fois, il fournit encore des résultats aussi neufs qu'importans pour le physiologiste, pour le médecin, pour l'instituteur et pour le moraliste.

En traitant l'histoire naturelle du penchant à la propagation, ou de l'instinct de la reproduction, je prouverai qu'il n'a ni son origine, ni son siége dans les parties sexuelles. Je démontrerai que ces parties sont subordonnées à une puissance supérieure, au cerveau, et que par conséquent, c'est dans le cerveau qu'il faut chercher tout ce qui a rapport á cet instinct, tant dans l'état de santé que dans l'état de maladie; que c'est le cerveau qui explique tous les phénomènes qui la concernent; que c'est le cerveau qui règle tout ce qui y a rapport; que c'est en agissant sur le cerveau qu'il faut modifier les diverses manifestations de cet instinct.

L'instinct de la Reproduction est une Fonction du Cerveau, et n'appartient nullement aux Parties Sexuelles.

Souvent déjà nous avons vu que les naturalistes attribuaient aux instrumens exécuteurs ce qui est dû aux organes législateurs. On attribuait la cabane du castor à sa queue, l'intelligence de l'éléphant à sa trompe, la peinture, la sculpture, et toutes les facultés intellectuelles de l'homme à ses cinq sens, particulièrement à ses mains.

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* For various reasons the remainder of this Section is retained in the original. For the application of the principles of Dr. Gall, contained in this Section, the reader is referred to the "*Edinburgh Phrenological Journal*," and to Spurzheim's first volume, on the organ of Amativeness.

Par une raison plus forte, l'on imputait à l'influence des parties de la génération sur le cerveau, ou même à ces parties seules, ce qu'on aurait dû imputer au cerveau et à son influence sur les parties sexuelles. Puisque l'on cherchait le siége des instincts et des penchans dans les ganglions et dans les plexus du bas-ventre et de la poitrine, qui n'aurait pas placé l'instinct de la génération dans les instrumens que l'on voyait seuls jouer un rôle dans cette fonction ?

Il y avait cependant un moyen d'être averti de son erreur. L'on voyait de temps en temps des enfans de deux, trois, quatre, cinq ans, où les parties sexuelles n'étaient encore nullement développées, où il n'y avait encore aucune sécrétion d'une liqueur irritante, être portés impérieusement vers l'autre sexe et s'adonner aveuglement à l' exercise de la volupté. L'on voyait des vieillards des deux sexes, chez qui la source du prétendu excitant était tarie, être tourmentés par des désirs que le flasque rétrécissement de leurs parties sexuelles ne permettait plus de satisfaire. L'on avait vu des castrats et des eunuques rechercher encore avec ardeur les jouissances vénériennes. Les physiologistes avaient même consigné des faits qui démontraient que des femmes privées de la matrice par vice de conformation primitive, n'avaient pas moins ressenti l'aiguillon de la chair.

L'on s'est, de tout temps, beaucoup occupé des changemens que l'époque de la puberté opère dans l'existence totale du jeune homme et de la jeune fille. Voyant le développement et l'activité naissante des parties sexuelles, l'on se faisait illusion, et l'on croyait que les facultés morales et intellectuelles qui commencent à se manifester avec plus d'énergie dans ce même moment, etaient subordonnées aux organes de la génération. Mais on avait tout-a-fait perdu de vue le cerveau, dont diverses parties acquièrent à la même époque un surcroit de développement et d'énergie. C'est la seule raison pourquoi le garçon et la fille cessent d'être enfans ; pourquoi les forces morales et intellectuelles se manifestent avec plus de vigueur ;

pourquoi cette activité se peint dans l'éclat de leurs yeux et dans l'expression de tous leurs traits, etc. etc.

C'est encore la raison pourquoi l'adolescent et la fille nubile conservent chacun leur caractère propre d'homme ou de femme, nonobstant le même changement opéré dans les parties sexuelles à l'époque de la puberté.

C'est encore la raison pourquoi certains cretins et certains idiots ne sont pas moins imbécilles, quoique leurs parties sexuelles soient parfaitement développées et que l'exercise de leurs fonctions soit très énergique.

C'est encore la raison pourquoi quelquefois des enfans, à l'âge de trois, cinque ans, ayant les parties sexuelles parfaitement développées et etant impérieusement portés à l'acte vénérien, restent pourtant enfans sous tous les autres rapports.

Tous ces phénomènes haurcient-ils pas dû désabuser les physiologistes, et leur faire chercher les changemens moraux et intellectuels observés à cette époque, ailleurs que dans l'action des parties sexuelles ?

Je vais rapporter quelques passages de l'ouvrage de M. Georget, où il parle des sympathies des organes cérébraux, T. II., p. 159 et suiv. On jugera facilement qui a le premier fait naître ces idées.

"Avant d'entrer dans le détail des faits, dit-il, remarquons que s'il s'agit d'un penchant, d' un désir, d'une passion, c'est dans le cerveau que nous aurons à en chercher le siége immédiat ; car cet organe seul est l'instrument des facultés intellectuelles et affectives, du moins chez l'homme et les grands animaux ; l'amour, le désir de l'union des sexes est donc dans le cerveau. Seulement il peut exister ailleurs un excitant, un besoin qui éveille, par influence sympathique, ce désir, ce penchant. Et tantôt alors le désir naîtra le premier, uniqu ement par la force cérébrale, et provoquera le besoin ; tantôt, au contraire, celui-ci sera le moteur de celui-là. Ce sont précisément là les rapports des organes génitaux et du cerveau.

"I. *Action du cerveau sur les organes génitaux; désirs vénériens naissant directement de l'action cérébrale.*

"Je ne crains pas d'avancer un paradoxe en soutenant que les causes les plus nombreuses et les plus puissantes des désirs vénériens ont leur source dans l'action même du cerveau. Les propositions suivantes en sont des preuves incontestables.

"1. Le désir vénérien est un phénomène cérébral.

"2. Les fonctions génitales sont en très grande partie sous l'empire de la volonté; je ne crois pas que le penchant à l'union des sexes soit jamais tellement irrésistible, que l'individu ne puisse y résister, du moins momentanément. D'ailleurs il suit la loi commune aux autres penchans, qui acquièrent d'autant plus de pouvoir et d'influence sur la raison qu'ils sont plus énergiques.

"3. Les désirs vénériens, et l'action de l'appareil organique destinée à les satisfaire, présentent dans leur développement, leur marche, leur terminaison, des phénomènes analogues à ceux que présentent les autres penchans, les fonctions qui sont sous la direction immédiate du cerveau. Ainsi, ces désirs et cette action tout-à-fait nuls à la naissance et pendant les premiers temps de l'existence, commencent à se manifester plus ou moins vite, plus ou moins fortement dans les années qui précèdent la puberté; de cette époque, qui arrive en général de douze à seize ans, quelquefois plus tôt, quelquefois plus tard, selon les dispositions particulières, les sexes, les climats, jusqu'à quarante-cinq ou cinquante ans, ils sont dans leur plus grande énergie; ils vont ensuite en décroissant, et finissent par s'affaiblir et s'éteindre à mesure que le cerveau perd de sa force, et en même temps que les autres passions.

"4. Les causes les plus fréquentes qui éveillent les désirs vénériens, qui excitent les organes génitaux, les situations de la vie plus propres à produire cet

effet, sont les idées, les conversations, les lectures lascives, des affections gaies, les réunions de sexes différens, telles que spectacles, sociétés, bals, etc.; la vue de personnes du sexe opposé; des rapports plus ou moins directs, des attouchemens, etc. Il est bien certain que l'excitation génitale, dans la grande majorité des cas, est précédée de l'idée, de la pensée de la jouissance désirée; c'est alors que l'on sent ce trouble de l'intelligence, ce feu brûlant qui semble couler dans les veines et se porter au lieu du sacrifice, que l'on est pris de ce frissonnement qui annonce une forte détermination partie du centre sensitif. Et, au contraire, les causes qui font oublier, rester dans l'inaction le besoin de la reproduction, sont la solitude, ou plutôt une société peu nombreuse, l'éloignement des sexes, l'absence des circonstances qui retracent des tableaux voluptueux, tels que romans, livres où sont des peintures vives et animées de l'amour, l'occupation continuelle de l'esprit à des travaux qui fixent l'attention, les fatigues musculaires, les affections morales tristes, l'ennui, le dégoût, la possession du même objet, etc.

"5. Pendant le sommeil, le cerveau a un tel empire sur les organes génitaux, qu'il suffit de rêves voluptueux pour exciter l'éjaculation. Et si l'excitation directe des organes génitaux, dit Cabanis, est souvent la véritable source des tableaux voluptueux qui se forment dans le cerveau pendant le sommeil, c'est aussi très souvent de ces tableaux seuls que l'excitation de ces mêmes organs dépend.* Pendant le sommeil l'imagination a une puissance plus étendue sur certains organs; par exemple, sur ceux de la génération, parce que dans cet état le cerveau ne recevant plus d'impressions externes, les impressions internes sont plus vives ou plus dominantes.†

"6. La pensée, l'imagination influent bien manifestement sur la puissance vénérienne, sur la prompti-

* *Rapports* etc., tome I, page 540.
† *Id.* T. II, page 184.

tude et la vivacité des jouissances vénériennes; ces jouissances sont plus ou moins vives, promptes, faciles, possibles même, selon les dispositions d'exaltation ou d'indifférence, de désir ou de dégoût, etc. Les exemples se présenteraient en foule pour appuyer cette proposition.

"7. L'excitation cérébrale légère que produissent les liqueurs alcooliques, le café, réveille le penchant amoureux; l'ivresse l'éteint. Entre ces deux états il en existe souvent un autre fort remarquable, ce sont des désirs violens, mais sans véritable besoin, une excitation purement cérébrale avec le calme, l'inaction la plus absolue des organes génitaux.

"8. On connaît les effets des prétendus charmes, sorts, etc., jettés sur de nouveaux conjoints dans les temps d'ignorance et de superstition; on connaît les succès des noueures et dénoueurs d'aiguillettes, etc.

"9. Les praticiens ont observé des phénomènes génitaux dans des affections cérébrales. Ainsi l'érection chez l'homme a été observée par Bichat, à la suite de commotions cérébrales; elle n'est pas rare dans l'ataxie; M. Serres l'a vue dans deux cas d'*affection du cervelet*, dont l'un était un épanchement de sang, et l'autre une inflammation. On sait que les pendus présentent fréquemment ce phénomène, et que des individus ont été assez dépravés pour chercher à se procurer des jouissances par un moyen aussi odieux.

"10. La saignée, l'affaiblissement des penchans et des passions par les macérations, les jeûnes, le régime végétal, l'usage de l'eau seule pour boisson, diminuent et finissent par faire oublier *les désirs charnels*, surtout chez les personnes qui n'en sont pas naturellement très tourmentées.

"11. M. Gall place le siége de l'amour physique dans le cervelet. C'est peut-être le point de la doctrine sur la pluralité des organes cérébraux et leurs fonctions particulières, en faveur duquel M. Gall a réuni le plus de preuves. L'observation de M. Serres est ici de quelque poids. M. Larrey en cite une d'un

militaire qui, après avoir reçu un coup de sabre sur la nuque, ne ressentit plus jamais aucun désir vénérien. Hippocrate assure que les Scythes se rendaient impuissans en se coupant les veines qui sont derrière les oreilles ; cette tradition, qui n'est sans doute point vraie quant au fait qu'elle nous transmet, indique pourtant qu'on avait saisi quelques rapports entre la nuque et les organes génitaux. Ferrand (de la Maladie d'amour ou Mélancolie érotique) assure que des médecins ont retiré des avantages de l'application de sangsues à la nuque ou derrière les oreilles, chez les malades atteints de cette affection. Enfin j'ai vu à la Salpêtrière une de ces femmes à *tempérament ardent*, dont toute la déraison consistait en des désirs vénériens des plus impérieux ; avant d'entrer dans l'hospice elle avait plusieures fois supporté, provoqué les approches de dix, douze ou quinze hommes dans un jour. Pendant son séjour, elle était très souvent prise d'une forte douleur à la nuque, en même temps qu'elle ressentait ce vif penchant à l'union des sexes, qu'elle satisfaisait par la masturbation, à laquelle elle se livrait jusqu'à dix ou douze fois par jour ; ce qui la soulageait beaucoup, ne lui causait aucun accident, et faisait disparaître immédiatement la douleur de la nuque.

" 12. Un fait trés important, et bien propre à éclairer la question qui nous occupe, est celui-ci : il est d'observation que la diminution et l'extinction de la possibilité du coït, chez l'homme (chez la femme on ne peut s'assurer de cette remarque), précède constamment la diminution et l'extinction des désirs vénériens ; c'est ce que l'on voit arriver naturellement chez les vieillards, et accidentellement chez les libertins, dont les organes génitaux ne sont plus excitables à force d'avoir été excités. Les vieillards qui n'ont pas la prétention de donner pour un acte de sagesse ce qui n'est réellement que l'effet de l'impuissance, conviennent sans peine de cette vérité ; et il n'est personne qui n'ait été à même d'observer la situation triste et misérable de ces malheureux dont les organes géni-

taux, flétris et comme inertes, ne peuvent plus répondre en aucune manière à l'action cérébrale manifestant des désirs vénériens d'autant plus pressans, qu'il est moins possible de les satisfaire.

II. *Action des organes génitaux sur le cerveau; désirs vénériens excités par l'action de ces organes.*

"1. L'état d'érection excite ordinairement les désirs vénériens, soit par la sensation agréable ou de gêne qui l'accompagne, soit en rappelant à l'esprit l'image de la jouissance dont cet état est une condition. Tantôt, comme nous venons de le voir, elle naît de l'influence cérébrale, mais d'autres fois ce sont des circonstances purement locales qui la provoquent, telles que des attouchemens, le frottement de la muqueuse du gland ou du vagin. Toutefois il est bien digne de remarque que l'acte vénérien ainsi excité, est beaucoup moins ardemment désiré que lorsque le cerveau en est le premier provocateur, à moins que le besoin n'ait le pouvoir de réveiller le désir dans toute son énergie.

"2. La plupart des maladies génitales n'ont aucune action sur le cerveau, comme excitans vénériens. Lors même qu'elles causent l'erection, comme on le voit dans certains phlegmasies de l'urètre, dans l'irritation du col de la vessie par l'usage de cantharides, cet état est plutôt douloureux, pénible, que propre à porter aux plaisirs de l'amour.

"3. L'action de la chaleur sur les organes génitaux favorise l'érection; le froid produit un effet contraire.

"4. Les physiologistes qui ne veulent tenir aucun compte de l'influence cérébrale sur les organes génitaux, et rapportent tout à ces organes, s'appuient beaucoup des résultats de la castration. Il est en effet certain que les personnes auxquelles on a enlevé les testicules de bonne heure, présentent des phénomènes fort remarquables. Il n'est pourtant pas absolu-

ment vrai que ces personnes soient entièrement sans désirs vénériens: on a de nombreux exemples du contraire. Les eunuques ou castrats ne présentent point les caractères de la virilité; ils conservent la complexion féminine. Comme les femmes, ils ont la voix enfantine, leur système pileux ne se développe point à la figure ni au thorax. Le cerveau reste chez eux sans énergie morale et intellectuelle, et comme les êtres faibles, les eunuques sont faux, dissimulés, trompeurs, vindicatifs. Narsès est peut-être la seule exception qu'ait offerte cette classe malheureuse ; par ses exploits et son courage, par son caractère, il se montra l'égal d'un grand capitaine. Les eunuques, ainsi que les animaux châtrés, engraissent promptement. Ces derniers, comme les premiers, n'ont point ou perdent les signes propres à leur sexe. Bien plus, quelques animaux, mais les mâles seulement, éprouvent des changemens très marqués lors de la saison des amours ; ainsi le bois du cerf croit d'une branche, certains oiseaux sont parés d'une hupe, et leur voix retrouve la faculté de chanter.

" Un fait ne peut anéantir un autre fait, et, bien que les testicules influent, n'importe comment, sur le cerveau, il n'est pas moins certain que cet organe est le siége du désir vénérien, et devient le plus souvent la cause excitante qui provoque le besoin de l'union des sexes. Tout de même, les muscles et l'intégrité du cordon rachidien sont essentiels à l'exercice des mouvemens volontaires; quoique le principe de ces mouvemens, leur point de départ réside dans le centre des volitions. Je n'entrerai ici dans aucune explication, parce que j'avoue que mes réflexions sur cet objet ne m'ont conduit à rien de satisfaisant touchant la nature des rapports des testicules et du cerveau.

" L'on a voulu trouver aussi chez la femme une partie de l'appareil génital qui correspondît au testicule, pour le siége du besoin de l'union des sexes, et la plupart des auteurs se sont déclarés en faveur de l'utérus. En sorte qu'ils placent dans cet organe

toutes les maladies érotiques ou prétendues érotiques; de-là les noms de *fureur utérine*, d'*hystérie*, de *suffocation de matrice*, par lesquels ils les désignent. Mais ici, non-seulement aucun fait ne rend la chose probable, il en existe qui prouvent évidemment le contraire : ainsi, l'on a observé des femmes privées d'utérus et extrêmement portées aux plaisirs de l'amour. Le clitoris a été regardé par quelques uns comme étant chargé de cette fonction; Moschio, Albucasis, Ferrand, en conseillent l'excision dans certaines affections libidineuses. M. le professeur Dubois prétend avoir retiré du succès de cette opération chez une jeune nymphomane. Cependant personne ne suit la pratique de ces observateurs, probablement parce qu'on n'en espère rien de bien avantageux.

Il suit de ce qui vient d'être dit, que toute exaltation morbide des désirs vénériens est une véritable monomanie, dont le siége ne peut être que dans le cerveau, et dont la cause, comme celle des désirs vénériens, doit le plus souvent être cérébrale. Je suis bien convaincu que, dans cette circonstance, les organes génitaux ne sont que secondairement excités, qu'ils ne sont que les complices du cerveau. Remarquez en effet, 1. que cette maladie a lieu précisément à l'aide des circonstances que nous avons considérées comme des excitans cérébraux : ainsi c'est dans les grandes villes, dans le grand monde, dans les classes qui fréquentent les spectacles, les bals, les sociétés, qui lisent des romans, qui n'ont aucune occupation qui les distraye ou les fatigue, qu'on rencontre des nymphomanes; on sait à peine ce que c'est dans les campagnes, les petites villes, où, pourtant, le besoin de l'union des sexes est aussi bien senti que dans ces conditions. 2. Que la masturbation qui éteint, satisfait le besoin, n'est ici presque toujours d'aucun secours, parce que ce sont des désirs particuliers, comme de posséder tel ou tel objet. 3. Les hommes dont l'imagination n'est en général que très peu occupée de ces sortes d'idées ne sont point non

plus sujets à cette affection, quoique, selon moi, ils aient des besoins plus pressans, plus forts que les femmes. Nous reviendrons d'ailleurs sur ce sujet dans la partie de cet ouvrage réservée à la pathologie. Les auteurs confondent avec cette maladie une autre affection qu'ils placent également dans les organes génitaux, dans l'utérus, quoiqu'elle n'ait le plus ordinairement aucun rapport avec elle, et que, seulement, elle la reconnaisse quelquefois pour cause, je veux parler de la prétendue hystérie. Un fait bien remarquable aurait pourtant dû frapper les médicins, et les éclairer sur le siége de ces maladies: c'est que les affections des organes génitaux, de l'uterus ou du vagin, du pénis, du testicule ou des ovaires, aiguës ou chroniques, telles que cancers, siphilis, blennorrhagie, hydrocèle, sarcocèle, hydropisie des ovaires, tumeurs utérines de toutes sortes, restent plus locales que toutes autres, ne se manifestent souvent que par des incommodités locales, ou même ne se rencontrent qu'après la mort, ayant été ignorées pendant la vie.

" M. Esquirol a connu une dame âgée de cinquante ans, dont les règles avaient cessé de paraître depuis un an, chez laquelle l'écoulement reparut et dura plusieurs années, par l'effet d'une passion amoureuse vive qui vint troubler son repos."

Déjà dans le premier volume, p. 387, M. Georget avait démontré que la volupté vénérienne est une sensation, une perception cérébrale; que tous les phénomènes qui y ont trait, sont également cérébraux, et que le sperme paraît uniquement destiné à exciter la vitalité du germe. " La jouissance vénérienne, dit-il, peut être considérée comme une joie extremement vive et de courte durée ; c'est le plaisir le plus vif, la sensation la plus délicieuse dont soient susceptibles les êtres sentans. Na nature a semblé, par-là, vouloir attacher un attrait puissant à l'acte important et universel de la reproduction.

" L'animal en rut, l'homme dans l'attente du plaisir,

sont tourmentés du désir de satisfaire un besoin devenu impérieux, irrésistible; toutes les idées sont absorbées par celle-la; la pensée n'a plus de force; quelquefois la raison en reçoit de légères atteintes; c'est une véritable monomanie momentanée ... Les mâles, dans les espèces qui ne se marient que passagèrement, se livrent souvent des combats sanglans pour obtenir la possession d'une femelle; d'autres parcourent des espaces immenses pour le même objet: l'homme ne le cede souvent en rien aux animaux dans de pareilles circonstances. Immédiatement avant la consommation de l'act reproducteur, l'esprit est dans une sorte de rêvasserie, de mélancolie douce; il semble goûter à l'avance ce plaisir toujours impatiemment attendu, et qui doit le plonger dans un océan de délices, la respiration est lente, expirante, entremêlée de longs soupirs, de soupirs sanglotans; le système musculaire est affaibli...Pendant l'acte vénérien, la sensation voluptueuse va toujours croissant jusqu'au moment où l'ébranlement nerveux devient tel qu'il offrirait tous les caractères d'une affection grave, si l'on n'en connaissait la cause; toutes les facultés cérébrales sont anéanties; la pensée est nulle; les sens sont insensible aux impressions des objets; l'insensibilité est générale et profonde, en sorte qu'on peut couper certains reptiles accouplés, sans pour cela les séparer; souvent la système musculaire entier est pris de spasme, de roideur, de convulsions; c'est quelquefois une syncope véritable, un état voisin de l'épilepsie...

"Immédiatement après la cessation de cette volupté convulsive, de cette surexcitation cérébrale, succède un état tout opposé, un affaissement général, proportionné à l'étendue, à l'activité du mouvement qui l'a précédé, aux dispositions du sujet, etc. Les facultés de l'esprit, les forces musculaires tombent dans un collapsus bien remarquable; les yeux, naguère si vifs, sont mornes, languissans; la physionomie exprime l'apathie, la tristesse, l'ennui, l'étonnement; le dégoût remplace les désirs; ordinairement alors l'objet

qui tout-à-l'heure captait toutes les affections, n'inspire plus que de l'indifférence, de l'éloignement, quelquefois même de l'aversion; c'est aussi alors que l'auteur de la *Nouvelle Héloïse* pense que la femme peut s'assurer si l'homme est conduit vers elle par quelque autre sentiment que par celui de la passion que le même instant voit éclore et disparaître, et si la tendre amitié ne comblera pas de sa douce influence le vide affreux que cette passion laisse lorsqu'elle est satisfaite."

Tout confirme donc la proposition, en apparence si paradoxale, que tous les phénomènes qui se rattachent aux fonctions des parties sexuelles, ont pour centre de réunion le cerveau.

Examinons maintenant quelle est la partie cérébrale qui préside à l'instinct de la génération.

Le cervelet est l'organe de l'instinct de la génération.

Personne ne soutiendra que le penchant à la propagation, ou l'instinct de la génération, soit un produit artificiel de la volonté, de l'entendement, de l'education, ou d'une influence extérieure quelconque. Ainsi je ne m'arrêterai pas à prouver que cet instinct est une force indépendante, un penchant propre existant par lui-même. Je n'exposerai pas non plus son histoire naturelle, qui, d'un côte, est suffisamment connue de tout le monde, et d'un autre côté, m'entraînerait dans des détails d'histoire naturelle presque inépuisables. Je passe donc de suite à l'essentiel, en commençant par faire concevoir à mes lecteurs comment m'a pu venir cette idée, aussi étrangère aux principes physiologiques qu'a l'opinion générale.

Historique de la découverte que le cervelet est l'organe de l'instinct de la propagation.

Une jeune veuve se trouva attaquée, peu après la morte de son mari, de mélancolie et de violentes convulsions. Ces accès étaient précédés par une tension et un sentiment de chaleur très désagréables dans la nuque. Quelques instans après elle tombait par terre dans un état de roideur, jusqu'à ce qu'enfin la nuque et la colonne vertébrale fussent violemment retirées en arrière. La crise ne mánquait jamais de se terminer par une évacuation qui avait lieu avec les tressaillemens de la volupté, et dans une véritable extase; après quoi, elle restait sans attaques pendant quelque temps.

Plusiers fois je lui soutins, avec le plat de la main, la nuque, durant ses accès, et j'y sentis une forte chaleur; mais j'y remarquai sourtout une proéminence bombée très considérable. Plus tard, cette dame m'avoua que depuis son enfance il lui avait éte impossible de résister à un besoin impérieux, et que dans les momens où ses désirs étaient les plus pressans, la tension et la sensation de chaleur brûlante dans la nuque l'incommodaient le plus.

Ces circonstances réveillèrent mon attention. Je me rappelai avoir remarqué des symptômes semblables dans des cas pareils, et je ne tardai pas à apprendre que des personnes d'un tempérament très ardent éprouvent dans la nuque une tension et une sensation de chaleur, dans certaines occasions, et sourtout après des émissions excessives et inconsidérées, ou apres une continence prolongée.

Apollonius de Rhodes dit, en parlant de l'amour passionné de Médée :

"Le feu qui la dévore s'attache à tous ses nerfs, et se fait sentir jusque derrière la tête, dans cet endroit où la douleur est la plus vive lorsqu'un amour extrême s'empare de tous les sens."*

* *Histoire abrégée de la littérature grecque,* de M. Schœll, vol. I. p. 99.

Van der Haar avait déjà appelé l'attention des médecins sur la connexion qui existe entre certaines affections maladives des parties génitales, et des mouvemens convulsifs, et des trémoussemens des muscles, accompagnés de douleurs et de sentimens de chaleur dans la nuque.

Tissot a consigné des observations du même genre. Un horloger de dix-sept ans, toutes les fois qu'il provoquait une ejaculation par l'onanisme, perdait connaissance pour quelques instons, et éprouvait des mouvemens convulsifs de la tête, qui était violemment retirée en arriére, et son cou enflait. Pendant tout le temps de ces accès, qui finirent par devenir habituels chez lui, il sentait de violentes douleurs dans tout la partie postérieure du cou. A la fin, il en résulta une faiblesse extrême des muscles extenseurs du cou. Chez un autre sujet, les mêmes causes produisirent une paralysie complète de ces mêmes muscles, de manière que le malade laissait constamment pencher sa tête sur sa poitrine.

Préparé comme je l'étais par mes précédentes découvertes, l'idée ne dut pas m'échapper qu'il pourrait bien exister une connexion entre les fonctions de l'amour physique et les parties cérébrales placées dans la nuque. En très peu de temps j'eus recueilli un nombre prodigieux de faits à l'appui de cette idée.

Avant tout, je dois fare connaître au lecteur la forme et la situation de cette partie du cerveau qu'on appelle *cervelet*, et la manière dont son plus ou moins grand développement se manifeste à l'exterieur.

PLATE IV. 1. on voit la surface inférieure de deux lobes du cervelet. PLATE XV. 1, 1, sa surface supérieure. PLATE VIII. sa partie latérale. Les Pl. V. VI. X. XI. XII. XVII. représentent des préparations propres à faire connaître sa structure intérieure.

Le volume du cervelet diffère beaucoup chez différens sujets du même âge. Chez les adultes, sa largeur est de quatre à cinq pouces, et son épaisseur de vingt à vingt-cinq lignes; sa longueur de deux à trois pouces et quelques lignes.

Le cervelet est placé dans le crâne, dans les grandes fosses occipitales. Ses lobes touchent, sur le devant, au rocher des temporaux, et par derrière à la partie transversale de la *spina cruciata*. Latéralement, il s'étend jusqu'à la pointe de l'angle inférieur des pariétaux; il occupe toute la partie inférieure du crâne, depuis la partie large du procès mastoïdien d'un côté, jusqu'à la partie moyenne de la *spina cruciata*, où il y a ordinairement à l'extérieur une saillie, et jusqu'à la partie large du procès mastoïdien de l'autre côté. Dans le sens de la largeur, il occupe en entier les grandes fosses occipitales d'un procès mastoïdien à l'autre.

Comme les os crâniens sont très minces partout où le cervelet les touche, il faut que la forme de leur cavité intérieure corresponde exactement à leur proéminence extérieure, et eette dernière doit rendre exactement la forme du cervelet. Par conséquent, le crâne sera dans cette région plus étroit, plus large, plus aplati, plus bombé, plus bas, plus haut, selon que le cervelet s'étend plus ou moins dans différentes directions. Que l'on compare les Pl. VIII. X. XI. XII.

Quelques savans prétendent que l'on ne peut pas juger de la grandeur du cervelet dans l'homme vivant; car, disent-ils, depuis la saillie que l'on sent presque immédiatement au-dessus de la fossette du cou, jusqu'au trou occipital, il est impossible de tâter le crâne. Mais c'est précisément dans cet endroit que les deux lobes du cervelet s'écartent, et laissent entre eux un intervalle dans lequel est placée la portion inférieure de la partie verticale de la *spina cruciata;* et c'est par cette raison que la forme du cervelet ne se trouve nullement masquée. A-peu-près à un demi-pouce latéralement, la partie postérieure-inférieure de l'occipital se voûte vers le bord postérieur du procès mastoïdien. Or, plus cette proéminence est bombée, plus elle descend vers la nuque, plus elle s'élargit vers les oreilles, plus aussi le cervelet est grand; dans ce cas, la nuque est large et forte, le cou arrondi, fort

et large derrière les oreilles. Lorsqu'au contraire le cervelet est peu développé, ces parties seront plattes, étroites, renfoncées; la nuque sera peu large entre les procès mastoïdiens; le cou, quoique épais en partant du tronc, sera étroit dans l'intervalle d'un procès mastoïdien à l'autre.

Ceci suffira pour mettre le lecteur à même de juger du développement plus ou moins considérable du cervelet.

Je considérerai ce sujet dans l'état de santé et naturel, dans l'état de santé modifié artificiellement, et dans l'état maladie.

Preuves prises dans l'état de santé, que le cervelet est l'organe de l'instinct de la propagation.

1. Chez les animaux dont la propagation ne s'effectue pas par le concours de deux sexes, on ne distingue rien qui resemble au cervelet. Chez tous les animaux, au contraire, qui s'accouplent, on trouve une partie cérébrale placée immédiatement au-dessus de la moelle épinière, partie qui remplace le cervelet dont sont doués les animaux plus parfaits.

S'il était possible de démontrer que cette conformation a lieu sans exception dans les plus petits animaux, soit de terre, soit aquatiques, cette circonstance suffirait seule pour établir que le cervelet est l'organe de l'instinct de la propagation.

A peine la force des faits m'eut-elle suggéré mes idées sur les fonctions du cervelet, que je fus frappé d'une difficulté. Les plantes se propagent; donc, il n'est besoin d'aucune partie cérébrale pour que l'acte de la propagation s'effectue.

Mais il faut bien distinguer ce qui, dans la propagation, appartient à la vie purement organique, de ce qui appartient à la vie animale.

La vie organique forme les principes d'êtres de son espèce, et opère la fécondation et le développement

sans conscience et sans participation de l'individu. La vie animale fait, de cette fonction sans conscience, une fonction accompagnée de conscience; cette fonction devient un besoin, un penchant extrêmement actif, et le satisfaire produit le sentiment de la volupté.

Dans les animaux plus parfaits, ces deux fonctions se trouvent réunies. La fonction organique est en rapport avec la fonction animale, de manière cependant que dans l'acte de la propagation, chacune d'elles joue un rôle qui peut être indépendant de celui de l'autre.

Les expériences de quelques naturalistes paraissent prouver, que l'on peut féconder les œufs de femelles de certaines espèces avec la liqueur séminale prise du mâle, de la même manière que les germes des plantes avec le pollen pris sur les étamines. Des conceptions qui ont eu lieu pendant la défaillance, pendant l'ivresse, ou un autre étourdissement qui abolissait la conscience, ne sont peut-être pas des événemens absolument rares. Les instrumens organiques de la propagation ont leur vie à eux, et ils entrent en activité indépendamment de la conscience de l'animal. Le coït exercé par la violence, l'approche d'un homme, accompagné de dégoût et d'horreur même de la part de la femme, ont la conception pour suite. Je connais des femmes qui, dans aucune période de leur vie, n'ont senti le moindre penchant pour les hommes, qui étaient incapables de comprendre comment un homme peut inspirer à une femme d'autres sentimens qu'un enfant ou une autre femme, qui ne cédaient aux désirs de leurs maris que par devoir, et qui, quoiqu'elles fussent devenues mères plusieurs fois, n'ont jamais éprouvé la moindre sensation de volupté.

Tout le monde sait qu'il n'existe aucune proportion entre la fécondité et le penchant à exercer le coït. Combien de fois les vœux des plus tendres époux manquent-ils d'être remplis! Il paraît même que, dans certains cas, un amour trop ardent peut mettre

obstacle à la fécondation. L'on a coutume de modérer l'ardeur des jumens, en les frappant, en les fatiguant, avant de les mener à l'étalon, ou en jetant sur elles de l'eau froide. J'ai eu plusieurs fois des métis femelles d'oiseaux, qui sollicitaient avec ardeur l'amour de tous les mêles, qui construisaient leur nid avec une activité infatigable, pondaient, couvaient avec une persévérance exemplaire, et qui lorsqu'elles voyaient leurs espérances déçues, s'abandonnaient à une profonde tristesse. Tout le monde connaît l'ardeur amoureuse aussi violente que stérile du mulet.

Comme donc la fécondité organique est absolument indépendante de l'accouplement animal, l'existence de la fécondation sans partie cérébrale ne peut nullement être alléguée pour prouver, que l'instinct de la reproduction est possible sans le concours du cerveau.

2. Dans la description du cervelet,* j'ai montré que chez la mammifères, il est composé d'une partie moyenne (la partie fondamentale), et des parties latérales, les lobes.

Chez tous les ovipares, chez les insectes, les poissons et les amphibies, la partie fondamentale constitue tout le cervelet.

Les oiseaux, (Pl. I. fig. 2. 5. 7. 6. n'ont que cette partie intégrante du cervelet que j'appelle partie fondamentale ou primitive, et que d'autres ont appelée *éminence vermiculaire* (PROCESSUS VERMIFORMIS.)

Chez tous les mammiféres, au contraire, les deux parties latérales existent; ells ont cependant, comme la partie fondamentale, différentes formes chez les différentes espêces, (Pl. III. 1. et IV. 1. représentent la surface inférieure du cervelet, et Pl. XVI. sa surface supérieure.

Cette différence essentielle du cervelet dans des espèces d'animaux qui diffèrent essentiellement par leur mode de propagation, fait présumer qu'il existe une connexion intime entre le cervelet et l'acte de la

* Tome 1 de mon grand ouvrage, p. 149, in-4o, et p. 176, in-fol.

propagation. Mais je passe à des preuves plus rigoureuses.

3. La manifestation successive, la croissance et la décroissance de l'instinct de la propagation, sont dans un rapport direct avec le développement et la décroissance du cervelet.

Chez l'enfant nouveau-né, le cervelet est, de toutes les parties cérébrales, la moins développée, à la vérité, sa proportion au cerveau est différente dans chaque individu; elle est tantôt, à-peu-près comme un à neuf, tantôt comme un à vingt, et quelquefois plus petite encore. Dans l'adulte, au contraire, elle est comme un à cinq, tout au moins comme un à sept. Les fibres nerveuses du cervelet sont, de tout l'encéphale, celles qui, les dernières, se montrent bien distinctes. Le cervelet acquiert son plus haut degré de développement vers la dix-huitième ou la vingt-sixième année.

Et c'est dans le même ordre que se développe le penchant de l'amour qui se glisse imperceptiblement dans le sein du jeune homme et de la jeune fille; les yeux devienment plus brillans, le regard plus expressif, la démarche acquiert de la prétention, l'un et l'autre tombent dans une inexplicable mélancolie enfantine; l'un et l'autre sentent un besoin dont ils ne sauraient se rendre compte, des désirs confus, jusqu'à ce qu'enfin la présence de l'objet aimé donne le mot de l'énigme, et répande sur l'âme tout entière des torrens de délices. La jeune fille et le jeune homme se trouvent élevés par la sentiment qui les domine au-dessus même de l'idéal de toute perfection; la résistance faible et involontaire que toute personne du sexe oppose aux premières entreprises d'un homme, devient une vertu angélique, et prête une magie nouvelle à l'amour, jusqu'à ce qu'enfin l'homme et la femme aient goûté, dans les bras l'un de l'autre, le suprême bonheur.

M. Sœmmerring, Ackermann, les frères Wenzel et d'autres, soutiennent qu'à l'âge de deux ou trois ans, tout au plus, le cervelet, tout comme le cerveau, ont acquis leur croissance complète.

M. Sœmmerring, que les autres auteures ont copie, s'est trompé ; il fonde son assertion sur ce qu'el a trouvé le cerveau d'un garçon de deux ans aussi grand que celui d'un adulte dont il fit l'ouverture en même temps. Il supposait que tous les individus humains ont une masse encéphalique à-peu-prèségale ; et dans cette hypothèse, sa conclusion serait juste. Mais comme le poids de la masse cérébrale varie dans les adultes, qu'il est tantôt de deux livres, tantôt de deux livres et demie, de trois livres, et quelquefois plus considérable encore, il peut bien arriver qu'un garçon de deux à trois ans, organisé de manière à acquérir de grandes qualités et de grandes facultés, ait une masse cérébrale plus grande qu'un adulte doué de qualités et de facultiés très médiocres.

Dans nos nombreuses dissections du cerveau, nous avons toujours été très particulièrement attentifs au cervelet. Mais si j'en excepte quelques cas extraordinaires, nous n'avons jamais, jusqu'à l'âge de seize à vingt ans, trouvé la même proportion entre le cervelet et le cerveau que chez les adultes. Il est facile de constater la vérité de ce fait, en comparant des crânes de jeunes garçons et de jeunes filles, avec des crânes d'hommes et de femmes. Quelle différence déjà entre le crâne d'un garçon de dix à douze ans, (Pl. XXXVII.,) et celui d'un enfant nouveau-né, (Pl. XLI.!) Chez l'enfant nouveau-né, (Pl, XLI.,) toute la base du crâne est encore rétrécie en un cône tronqué ; les procès mastoïdiens sont encore très rapprochés l'un de l'autre ; les bosses occipitales ne sont point encore proéminentes, elles sont plates. Dans la deuxième année, les procés mastoïdiens s'écartent davantage l'un de l'autre ; les fosses occipitales se creusent davantage en segment de sphère. Tous ces changemens sont encore bien plus sensibles dans le crâne du garçon de dix a douze ans. On remarque de même ce développement encore imparfait du cervelet, dans le crâne de la jeune fille de six ans, (Pl. XXXVIII.) Eu tournant vers soi la base du crâne d'un sujet impubère, on voit de suite que la

stance d'un procès mastoïdien à l'autre, distance qui étermine le diamètre du cervelet, est beaucoup moin-re que celle d'un pariétal à l'autre. Chez l'adulte, ı contraire, les deux distances sont, d'ordinaire, à-peu-rés les mêmes. Aussi ces faits ont-ils déterminé M. haussier à accorder enfin que le cervelet ne se dével-ppe que vers l'âge de l'adolescence.

A l'approche de la vieillesse, la turgescence ner-euse du cervelet diminue, et dans la même propor-on, l'homme et la femme deviennent peu à peu rangers à leur destination, jusqu'à ce qu'enfin l'un omme l'autre se trouvent isolés et sans but.

M. Rudolphi assure n'avoir jamais trouvé le cervelet lus petit chez les sujets âgés que chez les adultes.

Comme dans l'âge avancé toute la masse des nerfs prouve une diminution, pourquoi le cervelet ferait-il eul exception à cette règle? Que l'on compare ncore les fosses occipitales chez des adultes et chez es sujets très âgés. A moins que tous les os craniens e soient déjà amincis par l'effet de la décrépitude, on ouvera les fosses occipitales moins transparentes hez les sujets âgés que chez les adultes, et cela parce u'il s'est déposé de la masse osseuse à leur surface nterne, au fur et à mesure que le cervelet s'est rape-ssé. J'ai dans ma collection des crânes où le cerve-et s'était rapetissé presque jusqu'aux dimensions de elui d'un enfant nouveau-né, et où l'espace qu'il oc-upait a été resserré beaucoup, non-seulement par épaississement des parois des fosses occipitales, mais ncore par celui des rochers.

"4. La nature ne suit pas de marche uniforme dans e développement du cervelet. L'on sait quelle est influence du climat sur l'époque à laquelle les deux exes deviennent capables de l'acte de la génération. Iais il existe encore de grandes différences à cet égard 'individu à individu, dans le même lieu et dans la ıême famille. Tel garçon montre déjà de l'intérêt our le sexe dès l'âge de trois à quatre ans; chez 'autres, cet instinct dort jusqu'à la quatorzième ou uinzième année.

La même différences se manifeste sur le retour de l'âge. Chez tel homme la puissance virile est anéantie dès l'age de quarante ans; chez tel autre, elle fait entendre encore le chant du cygne à soixante-dix, à quatre-vingts ans.

Il n'est par rare que l'instinct de la propagation se manifeste avant l'âge ordinaire, de la manière la plus prononcée. J'ai vu à Paris un garçon de cinq ans qui, sous le rapport des forces corporelles, paraissait en avoir seize; ses parties sexuelles étaient entièrement développées; il avait une forte barbe, une voix rauque et mâle, en un mot tous les signes d'une virilité pleine et entière. Depuis quelques années déjà il avail satisfait, avec des femmes, l'instinct de la propagation. Je ne m'en laissai pas imposer par ces signes extérieurs. Je n'attribuai pas la manifestation précoce de l'instinct de la propagation au développement prématuré des parties sexuelles; car peu auparavant j'avais vu une fille de neuf ans qui paraissait être une femme toute formée. Elle ne manifesta que l'indifférence d'un enfant lorsque ses parens me la montrèrent, et jamais elle n'avait témoigné le plus léger intérêt pour rien de ce qui a rapport à l'amour physique. On trouve dans Buffon et ailleurs des exemples semblables de grands enfans qui avaient toutes les marques de la puberté, sans que l'on remarquât rien en aux qui eût rapport à l'instinct de la propagation. Chez la fille en question, le cervelet n'avait qu'un développement très insignifiant; mais il en est tout autrement du garçon de cinq ans: sa nuque était large, bombée et robuste, quoique le reste de sa tête eût acquis à peine les dimensions ordinaries à son âge: aussi ce garçon etait-il enfant sous tous les autres rapports.

Nous trouvâmes le cervelet tout aussi développé chez un garçon de dix ans qui était détenu dans une maison de correction, à Leipzig, pour avoir violé une jeune fille. A Paris, j'ai vu le garçon d'une mulâtre, âgé de moins de trois ans; il se jetait non-seulement sur de petites filles, mais sur des femmes, et les som-

mait avec audace et avec opiniâtreté de satisfaire ses désirs. Il ressentait dans les parties sexuelles, qui n'étaient point prématurément développées, mais qui présentaient des dimensions proportionnées à son âge, des erections plus que momentanées. Comme il était environné de filles qui se prêtaient á satisfaire ses désirs, comme a un jeu piquant pour elles, par sa singularité, il mourut de consomption avant d'avoir atteint la fin de sa quatrième année. Son cervelet était extraordinairement développé ; le reste de sa tête avait les dimensions ordinaries á son âge. Aussi ce n'était, sous tous les autres rapports, qu'un enfant mal élevé et gâté.

Il est réellement étonnant que les médecins et les naturalistes n'aient jamais cherché le siége du penchant aux plaisirs de l'amour, ailleurs que dans les parties sexuelles. Tous les jours on voit de jeunes garçons et de jeunes filles de trois, quatre, cinq ans, se livrer avec fureur á l'onanisme, sans répandre le moindre fluide, et sans que le développement de leurs parties pût faire craindre pour eux un penchant à ce vice. L'on se trompe beaucoup en croyant empêcher des enfans ainsi organisés, de contracter de pernicieuses habitudes en les garantissant contre les séductions du dehors. Cette précaution est applicable aux enfans ordinaries ; mais il en est dont la nature elle-même devient le séducteur. Qui est-ce donc qui séduit les jeunes singes ? Du reste, il arrive chez les vieillards quelque chose de semblable à ce qui a lieu chez les enfans ; leurs parties sexuelles sont souvent déjà paralysées, que des désirs effrénés les dévorent encore.

Tous les faits que je viens de citer d'enfans dont les parties sexuelles étaient ou n'étaient pas développées, et qui non-seulement sentaient l'impulsion de l'instinct de la propagation, mais étaient doués aussi de la faculté de'exercer le coït, et chez lesquels le cervelet seul avait acquis un développement prématuré, prouvent, jusqu'à l'evidence, qu'il faut chercher le siége de l'instinct de la propagation, non pas dans les parties génitales, mais dans le cervelet.

5. L'energie de l'instinct de la propagation est, chez les adultes, dans un rapport direct avec le développement du cervelet.

Il est des hommes et des femmes qui n'accomplissent l'acte de la cohabitation que par manière d'acquit. Le coït leur inspire de la répugnance et du dégoût. Ceux qui y attachent un grand prix sont, à leurs yeux, des personnes sensuelles, se ravalant au-dessous de la brute. On ne remarque ni chez ces hommes, ni chez ces femmes, la moindre différence des parties génitales par laquelle ils se distinguent des autres individus; mais dans ces cas, il y a toujours faible développement du cervelet.

Par la complaisance de M. le baron Larrey, j'ai vu un soldat chez qui l'antipathie pour les femmes était dégénérée en véritable manie. L'aspect d'une femme produisait en lui des convulsions violentes, et le faisait presque entrer en fureur. M. le docteur Spurzheim a vu un example semblable en Angleterre. Chez l'un et l'autre de ces sujects, le développement du cervelet était absolument resté en arrière.* Un médecin de Vienna, doué de talens très distingués, montrait une antipathie marquée pour les femmes, singularité que, dans le tems, nous attribuâmes à son goût pour la solitude. Quelques années après il mourut de la phthisie pulmonaire. Dans son crâne très volumineux (Pl. XLIV. 1. 1. 1. 1.) l' espace pour le cervelet est extrêmement petit; la distance d'un procès mastoïdien a l'autre est à peine de trois pouces: les bosses occipitales, au lieu d'être bombées, sont en partie tout-a-fait plates, en partie même déprimées, et par cela même d'une surface inégale.

Dans un abbé français, qui vivait à Vienna, nous admirions d'autant plus une continence exemplaire, et une conduite singuliérement réservée vis-à-vis des

* On m'a objecté qu'un organe ne saurait produire un effet opposé à ses fonctions. Mais l'estomac n'est. Il pas l'organe de l'appétit, et n'arrive-t-il pas qu'à raison d'une affection maladive de ce viscère, nous avous du dégoût pour tous les alimens?

dames, qu'il aimait la parure comme une femme, et passait la journée à aller d'une société dans une autre. Il mourut, et son crâne est du nombre de ceux que je conserve comme exemple d'un très faible développement du cervelet. Les bosses occipitales sont tellement plates, que l'on dirait que l'on a coupé la partie inférieure de l'occipital, (Pl. XLVIII. 1. 1.)

La dame dont j'ai parlé plus haut, p. 159, a la tête grande et belle comme celle d'un homme ; elle possède des talens distingués ; mais sa nuque a tres peu de largeur au-dessous des oreilles, ce qui indique un faible developpement du cervelet. C'est cette conformation que j'ai trouvée jusqu'ici chez toutes les personnes à qui la nature a refusé entirèment, ou auxquelles elle a accordé à un faible degré le besoin de l'amour physique et le plaisir pendant l'acte vénérien.

Une semblable organisation n'emporte pas de points de contact avec le beau sexe. Les portraits de Charles XII. (Pl. LXI. fig. 1.) de Newton, de Kant montrent, et certainement sans l'intention des artistes, que le cou de ces hommes célèbres était peu large, et par conséquent leur cervelet très peu développé. Est-il étonnant après cela que Saint-Thomas à Kempis, dans le portrait duquel je reconnais les mêmes caractères, se soit armé d'un tison pour repousser loin de lui une jeune fille remplie d'attraits ?

Voilà les hommes que la nature appelle au célibat.

Pour se faire une idée de la différence qui existe entre un faible développement et un développement considerable du cervelet, que l'on compare le crâne (Pl. VIII.) avec ceux dont je viens de parler tout-à-l'heure, et encore avec ceux où cet organe a acquis un développement extraordinaire, (Pl. XXXIX. et XL.)

A Vienne, une diseuse de bonne aventure, dévote et superstitieuse, quoique déjà âgée, entretenait toujours deux amans. Dans son petit crâne sphérique, (Pl. L. 1.) les bosses occipitales sont tres larges, très bombés, et très proéminentes vers le bas. La même conformation a lieu dans le crâne très large, (Pl. XXVII.) d'une femme

qui a été détenue pour vol dans la maison de correction de Grætz, en Stirie, et qui auparavant suivait les armées comme fille de joie. Un maître de langue qui, sous tous les autres rapports, menait une vie forte régulière, assurait qu'il ne pouvait jamais se rassasier de jouissances avec les femmes. La partie postérieure inférieure de son crâne, (Pl. XXXIX. 1. 1.) est très large, et tellement bombée de haut en bas, qu'il descend de plus d'un pouce plus bas au-dessous du méat auditif extérieur, que le crâne du jeune médecin solitaire, et du chaste abbé français. Le même conformation se trouve encore chez un médicin célèbre qui, en tres peu de temps, avait mis au tombeau, l'une apres l'autre, trois épouses jeunes et robustes, et qui, à l'âge d'à-peu-près cinquante ans, crut devoir prendre le parti d'entretenir dans sa maison quatre filles vigoureuses. Ce qu'il y a de plus remarquable, c'est qu'il n'existait pas la moindre trace de jalousie entre ces personnes, probablement par la raison que, comme elles me l'ont dit, elles étaient toutes les quatre plus que rassasiées de jouissance.

Que l'on compare aussi aux portraits de Charles XII, de Newton et de Kant, ceux de Piron et de Mirabeau, (Pl. LXI. fig. 2,) l'un et l'autre très sensuels ; de Nicolas Chorier, auteur de l'ouvrage intitulé ; *Meursii elegantiæ latini sermonis*, traduit en français sous le titre d' *Academié des Dames;* de l'Arétin, aussi voluptueux que caustique ; de François Ier., qui avait coutume de dire qu'*une cour sans femmes est une année sans printemps, et un printemps sans roses.* Les anciens sculpteurs donnent cette même nuque large et forte à Epicure, en quoi ils n'avaient certainement pas l'intention de lui attribuer les forces d'Hercule. L'on peut constater tous les jours cette observation dans la société.

Lorsque le cervelet acquiert un développement excessif, au point que la nuque forme, de haut en bas, une espèce de large poche bombée, l'instinct doit acquérir aussi une force d'impulsion désordonnée. Dans

ce cas, lorsque des motifs d'un ordre supérieur, et des qualités et des facultés éminentes ne viennent pas au secours d'individus ainsi organisés, les jouissances avec l'autre sexe, conformes aux intentions de la nature, ne suffisent point pour satisfaire leurs desirs et leur paraissent fades ; ils ne brûlent que d'un feu semblable à celui auquel se trouvent d'ordinaire réduits, par la réclusion, les membres des nombreuses communautés d'un même sexe.

J'ai eu occasion d'observer plusieurs hommes et plusieurs femmes qui étaient les esclaves de ce goût dépravé. La nuque large et voûtée frappe surtout chez les femmes. Presque toutes les femmes livrées à ce penchant ont, en même temps, une constitution robuste et mâle. Les hommes, au contraire, ont un physique efféminé, les membres arrondis, gras, potelés et petits, les mamelles très apparentes. Les anciens historiens dissent de Néron, livré aux plus sales voluptés : " que ses inclinations étaient peintes sur sa figure ; qu'il avait les yeux petits, entourés de graisse, LE COU GRAS, le ventre gros et les jambes minces ; que ses cheveux blonds et son visage plutôt délicat que majestueux, le faisaient d'abord reconnaître pour un efféminé." J'ai trouvé cependant quelques exceptions à cette règle.

En Hollande nous vîmes, dans une maison de correction, quelques hommes déjà âgés qui, avec une organisation avantageuse, du reste, s'étaient livrés à de semblables désordres. Ils avouaient leur impuissance de résister à l'impétuosité de leur penchant, et plusieures fois déjà ils étaient retombés dans le même vice ; ils étaient convaincus que leur conduite était blâmable et indécente ; mais ils demandaient qu'on ne les relachât pas, parce que, s'ils recouvraient la liberté, disaient-ils, leur passion les entraînerait encore. Nous fîmes remarquer à ceux qui nous accompagnaient le développement excessif du cervelet chez ces individus.

Que l'on me permette de faire ici une observation.

La personne qui vit dans un état peu conforme à sa vocation, se trouve en contradiction avec son état et avec elle-même. Est-il prudent, est-il juste de surprendre à des jeunes gens dans le cœur desquels couve peut-être sous la cendre un feu qu'ils méconnaissent, des vœux qui pendant toute leur vie les mettront en contradiction avec eux-mêmes? Les différens états, dans la société, ne devraient-ils pas résulter de la différente organisation des individus qui s'y vouent? Voulez-vous des Vestales et des Cénobites, choisissez ceux *qui sont sortis eunuques du ventre de leur mère.*

Ce que j'ai dit de l'espèce humaine, a lieu également chez les animaux. Il y a des chiens, des chevaux, etc., qui ne s'accouplent jamais; il y a des femelles qui, quoique leurs parties sexuelles offrent tous les signes de la chaleur, ne permettent pas l'accès au mâle. Là aussi la cause de cette anomalie se trouve toujours dans le développement défectueux du cervelet. Près de Berlin, on nous conduisit dans une étable ou se trouvaient cinq taureaux: chez l'un d'eux, nous ne trouvâmes pas la nuque à beaucoup près aussi large ni aussi robuste que chez les autres; et nous déclarâmes que ce taureau ne devait pas être, à beaucoup près, aussi bon mâle que les autres. "Vous avez raison, nous dit le propriétaire, M. de Beyme, ci-devant ministre d'état: on l'engraisse parce qu'il n'est pas bon à la tête du troupeau."

Les taureaux, les étalons et les béliers, sont d'autant plus ardens, au contraire, que leur nuque est plus large, plus arrondie et plus robuste. A Vienne, tous les amateurs de pigeons savent que les pigeons mâles qui ont la nuque la plus forte, sont ceux qui poursuivent les femelles avec le plus d'ardeur, et l'on profite de cette circonstance pour enlever les pigeons femelles du voisin, et les faire venir à son colombier. On prive de sa femelle le pigeon mâle le plus ardent; alors il fait des excursions dans les autres colombiers, y enlève des femelles, et les force à le suivre chez lui; bientôt le mâle de la colombe enlevée suit sa femelle, et c'est

ainsi que les enlèvemens se succèdent jusqu'à ce que le propriétaire dépouillé mette fin à ce jeu par la mort du ravisseur. Les rats, les souris, la taupe, le cochon-d'Inde, ont le cervelet très grand, et c'est pour cela même que l'instinct de la propagation est chez eux très actif.

Chez des animaux nourris abondamment, chez des serins jaunes, surtout chez des pigeons et des ranards de l'un et l'autre sexe, chez des chiens, des jumens, des étalons, des singes, on remarque assez souvent la même dépravation dont je viens de parler comme ayant lieu chez l'espèce humaine.

Tout autant de preuves que l'instinct de la propagation est dans une proportion directe avec le degré de développement du cervelet, et que par conséquent cette partie cérébrale doit être considérée comme l'organe de cet instinct.

6. La différence qui existe dans les deux sexes, pour le degré auquel se manifeste chez eux l'instinct de la propagation, dépend encore du degré de développement du cervelet.

C'est une question de savoir si, tant chez l'homme que chez les animaux, l'instinct de la propagation a un degré d'activité plus grand chez le mâle ou chez la femelle ?

J'accorde qu'il existe des exceptions pour certains individus; mais en général l'homme est doué d'un instinct de la propagation bien plus impérieux que la femme; et les observations suivantes vont prouver la vérité de ce que j'avance.

Chez les animaux, les femelles de plusieurs espèces, telles que los chiennes, les jumens, les vaches, sont restreintes, pour la manifestation de l'instinct de la propagation, à certaines saisons, à certaines périodes, tandis que les mâles sont disposés toute l'année à se livrer à l'amour. L'état habituel de ces femelles ne suffit donc pas pour entretenir en activité l'instinct de la propagation. Il faut qu'il survienne, en outre, une circonstance qui irrite leurs organes pour leur faire souffrir ou desirer l'approche du mâle.

Même chez ceux des animaux qui vivent dans un mariage aussi durable que le vie, comme la plupart des espèces d'oiseaux, les martres, les renards, les mâles sont plus ardens et plus disposés aux infidélités que les femelles. De-là, chez ces animaux, les jalousies et les combats perpetuels. Il est à remarquer que dans certaines espèces les femelles sont très jalouses, tandis que dans d'autres elles ne donnent aucune marque de jalousie.

Dans notre espèce aussi, l'homme est entraîné aux plaisirs de l'amour avec plus d'impétuosité que la femme. Hippocrate dejà avait consigné cette vérité. La nature a imposé à la femme les incommodités de la grossesse, les douleurs de l'enfantement, le devoir d'allaiter et de soigner les enfans. Elle a organisé la femme tout entière pour parvenir à ce but important et élevé. Chez l'homme, au contraire, tout ce qui a rapport à la propagation est restreint à la seule fécondation. Les plaisirs de l'amour sont un besoin impérieux pour le jeune homme, pour l'homme fait, et souvent encore pour le vieillard. Toutes les institutions sociales attestent l'abus que fait notre sexe de la supériorité de ses forces, et portent l'empreinte de son penchant jaloux pour la volupté.

Voyons maintenant si ces phénomènes s'expliquent par son organisation.

On pensait jusqu'ici que l'homme étant généralement plus fort, ses penchans doivent être plus violens par cela seul. Mais j'ai prouvé, dans la section sur l'organe de l'âme, qu'il n'existe absolument pas de proportion directe entre la violence des penchans, et l'activité des facultés d'un côté, et la force de la constitution prise collectivement de l'autre. Les animaux petits sont, d'ordinaire, plus ardens pour l'amour que les grands. Qui ne sait que souvent des hommes grands et des femmes grandes sont très indolens, et des personnes petites et faibles très ardentes dans la jouissance de volupté?

La différence de l'éducation n'explique rien non plus;

car d'abord son influence ne va pas jusqu'à détruire les dispositions naturelles. En second lieu, l'on ne doit pas oublier que même l'éducation, les institutions et les lois sont un résultat de notre organisation; ce n'est pas nous qui produisons tout cela, c'est l'auteur de notre être qui le produit par nous. En troisième lieu enfin, comment chez les animaux la différence de la manifestation de l'instinct de la propagation dans les deux sexes, pourrait-elle être produite par l'éducation?

Non, il en est tout autrement; une loi éternelle de la nature doit être fondée sur une base toute différente. Aussi en général le cervelet est-il sensiblement plus grand chez les mâles que chez les femelles. Dans la plupart des cas, lorsque l'on place des cerveaux d'homme et de femme, ou d'animaux mâles et d'animaux femelles à côte l'un de l'autre, celui de l'homme ou du mâle se distingue par un plus grand cervelet. La meilleure manière de rendre cette différence sensible, c'est de placer les encéphales dans l'eau afin qu'ils conservent leur forme, et ne s'applatissent pas par leur propre poids.

Cette observation s'est confirmée sur tous les animaux que j'ai été à même d'examiner, depuis la musaraigne jusqu'à l'éléphant.

Il paraîtrait presque que cette différence est plus marquée dans l'espèce humaine que dans les autres espèces d'animaux. Aussi n'existe-t-il guère d'animal avec lequel l'homme doive être tenté de troquer, si l'on met dans la balance qu'il est à même de jouir toute sa vie et dans toutes les saisons, que sa jouissance est la plus parfaite, etc. Que l'on compare les cervelets de fommes, PL. IV. X. XIII. avec les cervelets d' hommes, PL. V. VIII XI. XII. XV. ainsi que tous les crânes de femmes avec les crânes d'hommes.

On pourrait objecter que l'homme ayant en général une masse cérébrale plus considérable que la femme, doit avoir aussi un plus grand cervelet.

Mais j'ai montré qu'il n'existe pas de proportion fixe des parties cérébrales entre elles. Le cervelet est

indépendant du cerveau, et forme un organe propre. Quelquefois il existe, chez le même sujet, un grand cerveau et un cervelet extrêmement petit ; d'autres fois le cervelet est très développé, et le cerveau trés petit. Le jeune médecin dont j'ai parlé plus haut, qui fuyait les femmes, avait l'une des plus grosses têtes et l'un des plus grands cerveaux, et son cervelet était très petit. La diseuse de bonne aventure superstitieuse, au contraire, n'avait pas la moitié autant de cerveau que le jeune médicin, et son cervelet était beaucoup plus grand. En traitant de l'organe de l'amour de la progéniture, je montrerai que certaines parties cérébrales sont plus développées chez la femme que chez l'homme. Par conséquent cette objection se réduit à rien.

Pour faire cette observation sur les animaux, il faut connaître très exactment la situation du cervelet dans le crâne. Dans plusieures animaux, surtout chez les espèces qui ne marchent jamais debout, le cervelet est placé horizontalement et presque en totalité derrière le cerveau. Voyez Pl. XXXIII. les cerveaux du cangourou, fig. 3, du tigre, fig. 5. Chez ces animaux-là, on reconnaît le degré de son développement à la partie postérieure du crâne, au-dessus et des deux côtés du trou occipital.

Dans d'autres, le cervelet est à-peu-près comme chez l'homme, recouvert, en entier ou en partie, par les lobes postérieures du cerveau, et ce n'est que par l'inspection de la base du crâne que l'on peut s'assurer de son plus ou moins de développement. Voyez Pl. XXXIII. fig. 4, le cerveau du lion, et Pl. XXXIV. celui du singe, fig. 1, et de l'orang-outang. fig. 2 et 3.

Chez les oiseaux, le cervelet formé seulement par la proéminence vermiculaire ou la partie fondamentale, s'étend de la région postérieure moyenne des deux hémisphères du cerveau, jusqu'au trou occipital, (Pl. I. fig. 11, 5, 7, 6;) mais il ne remplit que la partie moyenne de l'occipital, car les parties latérales contiennent les organes de l'ouïe. Cette partie moyenne

est constamment plus large et plus bombée chez les oiseaux mâles que chez les oiseaux femelles. La Pl. LVII. représente, fig. 1, le crâne d'un coq; fig. 2, celui d'une poule; fig. 4, celui d'une dinde, et fig. 5, celui d'un coq-d'Inde. Comparez Pl. LVIII. le crâne du rat des prés, mâle, fig. 2, avec celui de la femme, fig. 1; le crâne du chat mâle, fig. 4, avec celui de la chatte, fig. 3, et le crâne du chien mâle, fig. 6, avec celui de la chienne, fig. 7, ainsi que Pl. LIX. le crâne du veau mâle, fig. 2, avec celui du veau femelle, fig. 1.*

Il ne faut pas oublier ici que la différence des dimensions du cervelet est plus grande, d'un sexe à l'autre, chez les espèces dans lesquelles les mâles sont, en tout temps, capables de s'accoupler, et où les femelles sont restreintes à cet égard à de certaines périodes, que chez les espèces dans lesquelles le mâle et la femelle sont l'un comme l'autre sous la même influence périodique.

Ainsi donc, la conformation du cervelet chez les deux sexes, s'accorde parfaitement avec ce phénomène physiologique, que l'instinct de la propagation est plus puissant chez les mâles que chez les femelles, et cet accord prouve encore que le cervelet est l'organe de cet instinct.

7. Le genre de caresses que se font certains animaux, aurait dû réveiller, depuis long-temps, l'attention des naturalistes. Tantôt c'est le mâle, tantôt la femelle, qui a l'habitude d'irriter la nuque de l'objet de ses désirs. Long-temps avant l'accouplement, le chat mâle mord amoureusement la nuque de la chatte, et quelquefois il continue ce jeu pendant une journée entière. J'ai vu souvent des chiennes en chaleur, donner à des chiens, peu ardens, des coupes de museau dans la nuque, pour les provoquer à l'accouplement. Le canard mâle, avant de procéder à l'acte de la fécondation, monte tranquillement sur la canne et lui passe trois ou quatre fois le bec sur la nuque, ce n'est qu'alors que la canne se blottit, et que l'accouplement a lieu.

* Dans toutes les figures des Planches LVII. et LVIII., les bosses occipitales sont marquées 1. 1.

Au printemps, j'ai l'occasion d'observer, à mon aise, les amours des moineaux, d'une chaumière placée dans mon jardin. Le mâle, en poussant des cris, expression de l'ardeur qu'il ressent, fait des sauts autour de la femelle, la tête fortement retirée en arrière, et les ailes déployées; la femelle paraît poursuivre le mâle et saute à tous momens sur lui, en lui donnant de forts coups de bec dans la nuque; après ce prélude, tous les deux gagnent en toute hâte un arbre où ils s'accouplent.

Les preuves que j'ai alléguées jusqu'ici sont suffisantes pour établir que le cervelet est l'organe de l'instinct de la propagation. J'en ai encore quelques autres, mais je me réserve de les exposer plus bas.

Observations générales sur l'organe de l'instinct de le propagation, et sur cet instinct luimême dans l'état de santé.

Les Grecs, les Arabes, et quelques pédagogues modernes, ont regardé le cervelet comme le siége de la mémoire. Willis déduisait le talent pour la musique, de la mollesse de sa structure; et Malacarne veut déterminer le degré des facultés intellectuelles, d'après le nombre de ses feuillets. M. Portal croit que le cervelet sécrète les esprits animaux, ou qu'il est destiné à remplir les fonctions du cerveau, dans le cas où celui-ci serait attaqué de maladie. Reil le considère comme une pile voltaïque. Plusieurs physiologistes le regardent comme la source de la vie organique: hypothèses qui ne sont appuyées sur aucun fait.

Tout comme la force de l'instinct de la propagation n'est dans aucune proportion avec la fécondité, de même il n'y a non plus aucune proportion entre le développement du cervelet et celui des parties sexuelles.

Il est indubitable que l'organe de l'instinct de la propagation fait discerner à chaque animal, le mâle et

la femelle de son espèce ; on serait même tenté, dans certains cas, d'admettre qu'il établit dans la nature une paix générale entre tout ce qui est mâle avec tout se qui est femelle. On sait que beaucoup d'animaux mâles, surtout les singes, les chiens, les étalons, les perroquets, déposent leur méchanceté habituellé, et oublient même leur colère devant les femmes. Les animaux femelles, au contraire, paraissent avoir des préférences pour les hommes. J'ai vu les taureaux les plus furieux, qui n'avaient pu être domptés ni par des chiens ni par des hommes, céder à une servante qui accourait le fouet à la main. D'un autre côté, j'eus beaucoup de peine, un jour, à sauver de la fureur d'une vache une dame avec laquelle je me promenais dans une prairie. Cette vache portait une haine indomptable aux femmes.

Peut-être, quelques-uns de mes lecteurs pensent-ils qu'on ne saurait admettre un organe de l'instinct de la propagation dans le cerveau, parce que chez beaucoup d'animaux l'activité de cet instinct est circonscrite à certaines périodes, et que chez eux, tántôt il semble ne pas exister du tout, et que tantôt il domine impérieusement l'animal. Mais, dans beaucoup de cas, cette objection serait applicable aussi aux parties sexuelles ; et du reste, il y a beaucoup d'autres instincts qui dorment dans certaines saisons, et qui se réveillent dans d'autres ; cependant, comme je ne tarderai pas de le prouver, leur organe existe toujours dans le cerveau.

Ce phénomène peut même s'expliquer en faveur de l'idée que le cervelet est l'organe de l'instinct de la propagation. J'ai rassemblé beaucoup de têtes d'oiseaux, au commencement du printemps, saison de leurs amours les plus ardentes ; j'en ai rassemblé d'autres au commencement d l'hiver, époque, où tout ce qui a rapport à la propagation est épuisé. Dans les têtes rassemblées au printemps, le cervelet est plus large et plus turgescent ; dans les crânes, la proéminence qui y correspond, est manifestement plus large et plus bombée que dans ceux recueillis au commencement de l'hiver.

Au printemps, toutes les parties situées à l'entour de la nuque reçoivent en abondance l'afflus du sang et une turgescence nerveuse propre. Le gosier se développe, et, en général, ces parties sont, pendant tout le temps des amours, dans un état de surirritation. Chez les chameaux femelles, il se forme à cette époque une tumeur qui suppure ou laisse suinter pendant tout le temps du rut, une liqueur d'une odeur très forte. Tout ceci prouve que les testicules et les ovaires ne sont pas les seules parties qui, dans la période du repos de l'instinct de la propagation, diminuent, et qui, dans la saison des amours, reprennent plus de plénitude.

De tous ces phénomènes, je conclus qu'il existe une réaction réciproque entre le cervelet et les parties qui l'environnent immédiatement, ainsi qu'entre lui et les parties sexuelles elles-mêmes. En traitant de l'etat de maladie, je fournirai, en faveur de cette assertion, des preuves plus convaincantes encore.

Voici encore une objection tirée du *Dictionnaire des Sciences Medicales*, t. XXXVII. p. 267 : "Pourquoi donc la protubérance affectée à tel sentiment ou à telle passion particulière, restant la même, y a-t-il tant et de si continuelles vicissitudes dans l'affection ou disposition sensitive correspondante ? Si l'amour physique ou l'appétit vénérien a son siége organique situé derrière la tête, pourquoi l'intermittence, les variations, les degrés d'énergie ou d'affaiblissement d'une telle passion, se proportionnent-ils toujours à l'état d'irritation ou d'action d'un foyer particulier de sensibilité, ou d'un appareil nerveux dont l'influence est assez connue ? Si c'est la prédominence d'un tel foyer, son excitation actuelle par le fluide séminal qui l'impressionne et l'irrite, qui détermine l'appétit et fait naître la passion physique de l'amour, pourquoi ne serait-ce pas là aussi qu'elle aurait son organe ou son siége propre ?"

Lorsque M. Delpit a fait imprimer cet article l'an 1819, mon *Traité sur l'instinct de la propagation* était déjà imprimé l'an 1818, et mes idées étaient connues

par mes leçons publiques et par tous les ouvrages de mes élèves. Pourquoi M. Delpit ne s'attache-t-il pas à reproduire toutes mes preuves et à les infirmer ou réfuter toutes les unes après les autres? Ces Messieurs ont la prétention de détruire les preuves les plus nombreuses de tout genre par une seule remarque, quelque hasardée qu'elle soit. Cela s'appelle bien, comme s'exprime Cabanis sur les facultés des femmes, enlever, avec un talent facile, légèrement la superficie des objects. Les collaborateurs d'un dictionaire ont pris l'obligation de transmettre à la postérité les connaissances de leur temps. Mais tous ceux qui ont parlé dans le *Dictionaire des Sciences Médicales* soit sur l'anatomie, soit sur la physiologie du cerveau, se sont permis, souvent même avec mauvaise foi, les plus puériles inexactitudes. D'abord pourquoi M. Delpit, dit-il, si l'appétit vénérien a son siége organique situé *derrière la tête?* Pourquoi ne dit-il pas avec nous *a son siége dans le cervelet?* N'y aurait-il pas là tant soit peu de malice? En second lieu, si M. Delpit et son commité s'étaient bien imbus de leur objet, ils auraient trouvé dans presque tous les traités sur cet instinct, que ses intermittences, ses variations, ses degrés d'énergie et d'affaiblissement ne se proportionnent nullement à l'irritation des parties sexuelles. Ils auraient trouvé que cet instinct est quelquefois très énergique, avant qu'il n'existe la moindre irritation dans les parties de la génération; ils auraient trouvé que cet instinct est encore trop souvent très actif, quand les parties sexuelles ne se prêtent plus à aucune irritation vénérienne; ils auraient trouvé que cet instinct existe quelquefois dans les castrats ou même dans des personnes mutilées ainsi par un défaut d'organisation primitive; ils auraient encore trouvé que c'est beaucoup plus l'action cérébrale que l'excitation des parties sexuelles par le fluide séminal, qui détermine l'appétit vénérien. Enfin ils auraient senti que, pour s'immiscer avec quelque espoir de succès dans les discussions sur la haute physiologie, il faut au moins avoir quelque

idée de la difference qui existe entre un organe législateur, regulateur, et ses instrumens d'exécution.

Preuves, prises de l'état de maladie, en faveur de l'assertion que le cervelet est l'organe de l'instinct de la propagation.

Influence de la castration sur le cervelet.

On opère la castration, ou dans la première jeunesse, ou dans l'âge adulte.

Dans le premier cas, l'influence de cette opération, sur la constitution tout entière, sur les instincts, les penchans et les facultés, est plus générale et plus marqués que dans le second. L'animal mâle quelconque, tout comme l'homme, qui l'a subie, prend les formes féminines. Chez l'homme, la barbe ne pousse pas, le gosier ne se développe point, et, par cette raison, le sujet n'acquiert jamais une voix mâle, etc. Voilà des phénomènes que tout le monde connaît; mais on n'a point fait attention au plus essentiel de tous, qui est le défaut de developpement du cervelet.

Le cervelet est arrêté dans son développement, et n'acquiert pas, à beaucoup près, les dimensions auxquelles il fût parvenu, si la castration n'avait pas été enterprise. Si l'on examine dans les crânes de hommes et d'animaux, châtrés jeunes, la place du cervelet, elle paraît comme *ratatinée;* elle est beaucoup moins large et moins profonde; même les os crâniens immédiatement contigus, sont plus épais, moins transparens et plus raboteux que dans les sujets non-châtrés. Que l'on compare (Pl. LVIII.) le crâne du chat coupé, fig. 5, avec le crâne du chat entier, fig. 2. Que l'on compare les crânes de lapins coupés, de moutons, de chevaux hongres, avec les crânes d'animaux mâles entiers de la même espèce. La différence frappe au premier coup-d'œil, et devient bien plus sensible encore lorsque l'on mesure les cavités qui renferment le cervelet, les fosses occipitales dans toutes leurs dimensions.

C'est de ce défaut de développement du cervelet, et point du tout de la moindre saillie des muscles, qu'il résulte, comme je l'ai prouvé dans la section de l'influence du cerveau sur la forme du crâne, que tous les animaux coupés ont une nuque moins large et plus grêle que les animaux entiers, tels que le bélier, le taureau, etc. Cette différence est très marquée, même chez le coq et le chapon, quoique dans cette espèce le cervelet soit placé dans le milieu de la partie postérieure du crâne. . Voy. (Pl. LVII.) le crâne du chapon, fig. 3, et celui du coq, fig. 1.

Ce développement imparfait du cervelet est aussi la seule cause pour laquelle l'instinct de la propagation ne se manifeste pas, ou se manifeste d'une manière très imparfaite. Si Boileau n'avait pas été privé de la virilité par le coup de bec qu'un coq-d'Inde lui donna dans son enfance, il n'eût certainement pas épanché sa bile castique sur le beau sexe ; et la cruauté avec laquelle les eunuques, à ce que l'on dit, traitent les femmes, prendrait du moins une autre direction, si l'on n'avait pas, dès leur enfance, arrêté le développement de leur cervelet.

Lorsque la castration a lieu après la fin de la croissance, ou du moins à une époque où le cervelet est en grande partie développé, elle n'empêche ni la manifestation de l'instinct de la propagation, ni ne détruit la faculté d'exercer le coït. Preuve certaine que l'instinct de la propagation dépend d'autres conditions que de l'existence des parties génitales, et de la liqueur séminale.

Quelques physiologistes qui déduisent l'instinct de la propagation d'une propriéte irritante de la liqueur prolifique, soutiennent que chez les châtrés la semence reste dans le sang, et que c'est là ce qui explique tous les phénomènes qui ont lieu encore chez les eunuques.

Cette explication suppose qu'il peut exister dans le sang une véritable liqueur spermatique qui n'aurait pas été sécretée par les testicules, reçue dans les vésicules séminales, et absorbée de là ; mais cette hypo-

thèse est en contradiction avec les principes de l'anatomie et de la physiologie. Dans la manière de voir de ces physiologistes, la liqueur séminale existerait également dans les alimens. Et pourquoi donc n'en existerait-il pas dans le sang des animaux qui ont été coupés dans un âge tendre, dans le sang des femelles et des femmes?

Pour se tirer d'embarras, ils ont recours à la liqueur des prostates; c'est elle qui, à les en croire, produit chez les eunuques, non-seulement l'instinct de la propagation, mais qui les rend encore propres à en exercer l'acte.

Mais on sait que la sécrétion de cette liqueur a encore lieu chez des sujets décrépits, et qu'elle n'existe pas du tout chez les enfans, qui cependant ont de fréquentes érections.

Il paraît pourtant que les suites de la castration ne sont pas les mêmes ches tous les sujets. Chez quelques-uns, les poils de la barbe tombent pour ne plus repousser; le gosier qui était déjà développé, se contracte de nouveau, et la voix redevient celle d'un garçon impubère. Dans ce cas, et je suis tenté de dire dans tous les cas, l'influence de l'opération finit par se manifester sur le cervelet. Il ne diminue pas toujours au point de devenir aussi petit que si son développement avait été empêché dans l'enfance; mais il se rapetisse et s'aplatit considérablement; les bosses occcipitales aussi, qui déjà étaient très bombées s'aplatissent, et l'intervalle entre les procès mastoïdiens se resserre. Ces changemens sont suivis de plus de calme du tempérament, et enfin de l'impuissance.

Ainsi donc, l'observation faite sur les eunuques, prouve que l'instinct vénérien ne dépend point des parties génitales, mais du cervelet.

Tout cela n'empêche pas M. Richerand de dire:

"Le cranioscope fait, du cervelet, l'organe de l'amour physique, c'est-à-dire qu'il y loge la faculté génératrice: c'est en vain qu'on lui objectera que le

cervelet des eunuques est aussi volumineux que celui des autres hommes; que l'amputation des organes génitaux, faite de bonne heure, éteint les désirs amoureux, sans empêcher pour cela le cervelet de s'accroître; qu'il est très difficile, pour ne pas dire impossible, de juger sur une tête entière, et non dépouillée de ses chairs, de la saillie plus ou moins forte des bosses occipitales inférieures, correspondantes au cervelet; que les blessures de cette région, comme toutes celles de la moelle de l'épine, doivent diminuer la faculté génératrice, de même qu'elles affaiblissent toutes les autres facultés; que les médecins de cet évêque d'Allemagne, atteint d'une folie amoreuse, dont il raconte l'histoire dans ses leçons, le guérirent par la castration, et non en lui faisant une blessure à la nuque; que ce n'était point par l'effet d'une plaie du cervelet que les Scythes, dont parle Hippocrate dans son immortel ouvrage, *de l'air, des eaux et des lieux*, devenaient inhabiles à la génération, qu'en général les animaux ont le cervelet plus volumineux que l'homme, quoique le plus grande nombre soit privé de la faculté de faire l'amour en tout temps, et présente moins de salicité..... .....M. Gall ne tient aucun compte de toutes ces observations, et poursuit sa carrière sans daigner y répondre.

> "Tel un ânon broute l'herbe naissante,
> Malgré les cris du maître et des servantes." *

Après ce qui a été dit jusqu'ici, je peux me contenter de faire remarquer qu'il est absolument faux de dire que les animaux ont, en général, le cervelet plus grand que l'homme. Le bœuf, le cheval, l'âne, le cochon, et une infinité d'autres, l'ont manifestement bien plus petit. Il n'y a que l'éléphant et les grands mammifères aquatiques qui l'aient plus grand.

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* *Des Erreurs popularies relatives à la médicine*, seconde édition, p. 265.

Influence de la castration unilatérale sur le cervelet.

De tous les faits qui prouvent que le cervelet est l'organe de l'amour physique, l'effet produit par l'ablation d'un seul testicule est, sans contredit, le plus péremptoire.

Toutes les fois qu'on a enlevé un seul testicule à un animal, de quelque espèce qu'il soit, le lobe du cervelet, du côté opposé s'atrophie visiblement, ou est altéré dans sa substance d'une manière quelconque.

M. Dannecy m'a communiqué le fait suivant, qu'il a observé lui-même à l'hospice de l'Ecole de Médecine, en présence de M. Patrix, chirurgien en second de l'établissement, et de plusieurs élèves : il est consigné sous le n°. 108 (15 juillet 1817,) dans le cahier d'annotations pathologiques de l'hospice. Dans l'autopsie de Jean-Michel Brigaud, mort le 14 juillet 1817, après avoir été opéré d'un sarcocèle, du côté droit, le 30 décembre 1815, on remarqua ce qui suit : Le cerveau et le cervelet étaient couverts d'une couche légère, d'une substance blanche albumineuse transparente. Le lobe gauche du cervelet était beaucoup plus mou et plus flasque que le lobe droit. Ses circonvolutions, ou plis, paraissaient aussi plus affaissés du même côté. Chacun de ces lobes ayant été ouvert exactement à six lignes de la partie latérale correspondante à la moelle allongée, on a été surpris de voir combien la proportion de la matière blanche et de la matière grise était supérieure dans le lobe droit : la différence, en plus, a été estimée à plus d'un tiers ; aussi la développement intérieur du crâne correspondait à cette différence.

M. le baron Larrey m'envoya un soldat qui, dans l'operation d'une hernie, avait perdu le testicule droit. Plusieurs années après, son œil droit s'affaiblit, it commença à loucher de l'œil malade, et ne pouvait presque plus distinguer les objets de cet œil. J'examinai sa nuque en présence des deux médecins qui me l'avaient amené, et j'y trouvai la bosse occipitale, du côté

gauche, beaucoup moins saillante que celle du côte droit ; la différence était tellement sensible, que les deux médecins en furent frappés au premier coup-d'œil.

J'ai fait châtrer unilatéralement, plusieurs lapins, les uns du côté droit, les autres du côté gauche. Les ayant fait tuer six à huit mois après, j'ai trouvé, sans exception, le lobe du cervelet, du côté opposé à celui où la castration avait été opérée, plus petit, et la bosse occipitale plus aplatie que l'autre.

Je connais, il est vrai, un homme qui a perdu un testicule, il y a quatre ans ; et à l'heure qu'il est, on ne remarque aucune différence entre ses bosses occipitales ; mais ce fait ne prouve rien contre ce que j'ai avancé plus haut, car le changement peut exister dans l'intérieur, sans être, jusqu'ici, devenu sensible au dehors.

Influence de la lésion des parties sexuelles sur le cervelet.

Depuis long-temps, les chasseurs ont observé que les lésions des testicules ont, chez les chevreuils et les cerfs, une influence remarquable sur le bois. L'animal ne le jette plus, et il se déforme de différentes manières ; il y naît des excroissances fongueuses, ou en choux-fleur. Nous vîmes, à Marbourg, une collection considérable de bois ainsi déformés. Tout le monde connaît la différence des cornes des bœufs, avec celles des taureaux.

D'après quelles lois ces phénomènes ont-ils lieu ? C'est là une question qui peut donner lieu à des opinions très divergentes. En conséquence de ce que j'ai dit plus haut, en parlant de l'influence du cerveau sur le crâne, dans l'état de maladie, je soutiens que dans tous ces cas, il s'opère d'abord un changement dans le cervelet ; qu'il y a dans cette partie diminution de la plénitude nerveuse. J'ai prouvé, dans la même sec-

tion, en alléguant des faits nombreux, que la substance osseuse du crâne devient ou plus dense ou plus épaisse, toutes les fois que le cerveau a commencé à diminuer, soit par suite d'une longue maladie cérébrale, soit par suite de la vieillesse. Ce n'est que de cette manière que l'on peut concevoir, après la lésion des testicules, l'excessive croissance du bois, comme une suite de la diminution du cervelet, produite par ces lésions.

Une autre observation, faite également sur les cerfs, paraît constater l'influence réciproque du cervelet et du bois. Lorsqu' immédiatement avant l'époque du rut, on scie le bois tout près de la couronne, la saillie du cerf devient inféconde. Cependant on dit qu'un daim, qui était abondamment nourri dans un parc, a fait exception à cette règle.

J'en viens maintenant à des faits que j'ai observés sur l'homme même, et qui ne laissent aucun doute sur l'influence nuisible des lésions des testicules sur le cervelet.

Un homme de trente ans s'était froissé le testicule gauche, à l'âge d'à-peu-près vingt-quatre ans; peu à peu, ce testicule s'était atrophié, et avait pris la consistance d'une petite pelotte de coton. Après avoir suivi mes leçons, il fut curieux de savoir si cet accident avait eu quelque influence sur son cervelet; et il ne tarda pas de s'apercevoir que sa bosse occipitale droite, était beaucoup moins bombée que la gauche. J'ai moi-même examiné soigneusement ce sujet, et j'ai trouvé parfaitement confirmées, tant l'atrophie du testicule gauche, que celle du côté droit du cervelet.

Peu après, un domestique vint me trouver, et se plaignit à moi d'être depuis quelque temps beaucoup plus indifférent pour les femmes qu'à son ordinaire, indifférence qu'il attribuait à un coup qu'il avait reçu aux testicules quelques années auparavant. Chez lui aussi je trouvai le testicule gauche presque entièrement atrophié; de suite je portai la main à sa nuque, et je sentis que la bosse occipitale droite était entièrement aplatie; la gauche, au contraire, était assez bombée.

Par hasard, l'un de mes auditeurs se trouvait dans ma maison ; je le fis entrer sans lui dire un seul mot. Dès qu'il eut examiné la nuque du domestique, il lui demanda s'il avait un testicule plus petit que l'autre : question qui jeta cet homme dans un grand étonnement. Voilà donc deux cas d'atrophie du lobe du cervelet, du côté opposé à celui où il y a eu lèsion d'un testicule. Je rapporterai encore quelques observations qui nous autorisent à conclure que les fibres médullaires, remontant des parties génitales le long de la moelle épinière jusqu'au cervelet, s'entrecroisent avec les fibres médullaires de cette partie, tout comme une grande partie de la moelle allongée s'entrecroise avec une grande partie du cerveau.*

M. le baron Larrey m'envoya un soldat âgé de trente ans qui, il y a neuf ans, s'était froissé les testicules contre la palette de la selle, à la suite de quoi ils s'étaient enflés, et étaient devenus très douloureux ; peu de temps après, ils commencèrent à s'atrophier de manière qu'il n'en resta plus que de petites pelottes membraneuses. Les bosses occipitales sont étroites, renfoncées et raboteuses ; il ne sont pas la moindre irritation dans son flasque membre viril, et les femmes lui sont maintenant tout-à-fait indifférentes, quoique autrefois il y fût très adonné.

Les faits suivans consignés dans les cahiers d'anatomie pathologique de l'Hôtel-Dieu, m'ont été communiqués par M. Rousseau, chargé de la rédaction de ce recueil.

Le nommé Florat, âgé d'environ soixante ans, mourut le 19 mars 1818, d'un cystite avec inflammation et suppuration de la prostrate. Le testicule gauche avait un volume un peu moindre que le droit ; l'épididyme gauche était gonflé, endurci, et contenait un peu de pus ; le lobe droit du cervelet était moins considérable que le gauche.

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* En opposition avec ce que nous avons dit, vol. 1.

Une femme mourut d'une péritonite aiguë, qui avait été précédée d'un hydropisie de l'ovaire droit, et ensuite d'une ascite; on avait procédé plusieurs fois à la ponction. A l'autopsie, on trouva l'ovaire converti en trois vastes kystes remplis de sérosité: le lobe gauche du cervelet était sensiblement atrophié.

Chez un autre femme, morte le 11 novembre 1818, on trouva à l'autopsie cadavérique, dans l'ovaire droit, un kyste contenant environ une cuillerée à café de sérosité limpide; l'ovaire gauche était sain. Le cerveau n'offrait rien de remarquable, mais le lobe gauche du cervelet était d'un tiers environ plus petit que le droit.

Un jeune homme de vingt-un ans, grand, d'une constitution sèche, entra à la Charité dans la première quinzaine du mois d'août 1822. Il avait l'air hébêté, parlait à peine, et se plaignait d'une douleur profonde et continue à la partie postérieure de la tête du côte droit. Il avait les yeux saillans, et la peau de la figure ainsi que celle de tout le corps, sale, sèche et comme terreuse. Il restait couché sur le dos et se remuait difficilement, quoiqu'il ne fût paralysé ni du sentiment, ni du movement, mais sa sensibilité était fort obtuse. Depuis qu'il était malade il n'avait eu aucune érection. Le testicule droit était d'un volume ordinaire. Le côté gauche des bourses était plus volumineux; il y avait un hydrocèle qui empêchait d'apprécier le volume du testicule de ce côté.

Ce malade mourut le 6 septembre, on l'ouvrit le 7. On trouva le lobe droit du cervelet plus gros que l'autre, et l'on voyait une saillie bien marquée à sa face supérieure. On incisa de côté sur cette saillie, et on trouva une tumeur rougeâtre, d'apparence charnue, au milieu de la substance médullaire qui offrait les changemens suivans: d'abord elle était plus large que celle du côté opposé; sa couleur était d'un jaune clair; elle avait une résistance assez grande, puisqu'on en soulevait une lame assez longue sans qu'elle se rompît; on ne pouvait pas en faire autant sur celle du lobe

gauche. J'ai dit une lame, parce que la portion de substance médullaire qui entourait immédiatement la tumeur avait l'aspect d'une membrane d'une demi-ligne d'épaisseur ; je crus même d'abord que c'était un kyste, mais elle se confondait presque partout avec la substance médullaire environnante ; en quelques points seulement on pouvait la séparer.

Sa verge était assez longue, très ridée, et le gland découvert.

Le testicule droit, comme je l'ai dit, était de volume ordinaire ; il y avait du côté gauche un hydrocèle de volume médiocre, et le testicule de ce côté était plus mou et un peu moins volumineux que l'autre.

Ces observations confirment l'idée que, dans l'état de santé aussi, le cervelet doit diminuer chez les mammifères et les oiseaux, toutes les fois qu'après le temps de la chaleur les testicules diminuent.

Influence des lésions du cervelet sur les parties génitales.

Hippocrate dit des Scythes : "Lorsqu'ils se sentent malades, ils s'ouvrent une veine derrière chaque oreille ; lorsque le sang en a coulé, ils se trouvent assoupis de faiblesse, et s'endorment ; au réveil quelques uns se trouvent guéris, mais il n'en est pas ainsi de tous. Pour moi, je pense que cette méthode curative leur est très pernicieuse, car il y a derrière les oreilles des veines dont la section entraîne l'impuissance, et c'est précisément à celles-là, je crois, qu'ils se saignent ; car lorsqu'après ils s'approchent de leurs femmes, il se trouvent dans l'impossibilité d'exercer le coït." *

Alcméon regardait aussi la liqueur séminale comme une partie constituante du cerveau. Cette opinion paraît avoir été assez généralement adoptée dans l'antiquité.

* Hipp. de aere, locis et aquis, no. 20, edit. a Foës.

On trouve dans les *Mémoires de Brantôme, contenant les vies des hommes illustres et grands capitaines de son temps*, le passage qui suit: "M. de Burie mourut sans lignée, et n'en eut jamais. Sa femme qui était naïve et libre, disait qu'il n'avait pas tenu à lui ni à elle, car ils en avaient bién fait le devoir pour en avoir, mais que son mari avait eu autrefois, aux guerres, un coup d'épée ou de masse d'arme sur la nuque du cou qui lui empêchait le conduit de la semence, si bien que la vraie crême ne pouvait ni passer, ni couler, sinon quelque petite espèce d'eau claire dans sa matrice, qui ne servait nullement pour engendrer ni concevoir.*

A Vienne, je fuis consulté par deux officiers devenus impuissans à la suite de coups de feu qui leur avaient rasé la nuque. L'un d'eux recouvra peu à peu la faculté génératrice, se maria, et fut père de plusieurs enfans. A cette époque, je n'étais pas encore attentif aux changemens que subit la nuque elle-même après de semblables lésions.

A Berlin, M. le docteur Formey nous parla d'un homme qui, à la suite d'une blessure à la nuque, eut d'abord des érections désordonnées, après quoi il tomba dans une impuissance complète; il recouvra cependant la virilitè après six mois. Dans ce cas, l'inflammation causée par la blessure, avait d'abord produit une irritation dans le cervelet; cette irritation fut suivie de faiblesse, comme le sont d'ordinaire toutes les inflammations et toutes les surirritations; de-là d'abord impuissance, et puis retour des forces, retour de la virilité.

Un cocher qui jusque-là avait été un vaillant champion au champ d'amour, se frappa la nuque contre une poutre; depuis cet accident, sa femme se plaignit à moi de ce que les forces de son mari s'éteignaient davantage de jour en jour, et de ce qu'il était devenu complétement nul. M. le baron Larrey a trouvé la

* Edition in-12, Londres, 1739, t. II, p. 182.

remarque qu'Hippocrate fait sur les Scythes, confirmée chez les Egyptiens : ils s'appliquent fréquemment des ventouses dans la nuque, et des observations multiplées ont convaincu M. Larrey que ces saignées souvent répétées, affaiblissent considérablement les soldats, sous le rapport de l'acte de la cohabitation.

Ce savant a eu la complaisance de me communiquer les faits qui suivent, relatifs à l'influence des lésions de la nuque sur l'instinct de la propagation.

Il m'a fait voir, avant son départ pour l'Espagne, un soldat de la garde impériale, jugé dans le cas de réforme, pour une faiblesse générale de tous les organes, et notamment pour la nullité d'action des parties génitales. Ce sujet avait été blessé à la nuque, par un éclat d'affût de canon, à la prise d'Alexandrie, lors de la descente de l'armée française en Egypte. Il était pour lors âgé de dix-huit ans. Après une suite d'accidens graves, qui accompagnèrent cette blessure, et pour lesquels il resta á l'hôpital l'espace de trois ou quatre mois, ses parties génitales tombèrent dans un état d'atrophie, et il perdit avec leurs fonctions physiques, l'érection du membre viril, et le désir de voir des femmes. Ce jeune homme est resté imberbe, frêle, décoloré, faible, languissant, et parlant comme une femme. Il était parvenu à l'âge de trente-deux ans, lorsqu'il a été réformé, et il ne paraissait en avoir que dix-huit.

Un autre garde impérial, du corps des chasseurs à cheval, s'est présenté à M. Larrey, avec une cicatrice qui coup transversalement la bosse occiptale, résultat d'un coup de sabre qu'il a reçu à la bataille de Wagram. Jusqu'alors ce chasseur avait fréquenté les femmes comme tous ses camarades. Depuis ce moment, il a été privé non seulement de tout érection, mais encore il a perdu tout désir.

Auguste François, maréchal-des-logis des cannonniers à cheval de la garde, reçut, au combat de Benevente, un coup de balle de mousquet qui traversa, d'un côté à l'autre, les attaches des muscles exten-

seures de la tête, en effleurant les bosses occipitales inférieurs, très saillantes chez ce sujet, lesquelles furent dénudées des attaches aponévrotiques. M. Larrey brida les deux overtures produites par la balle, et il retira une portion de la chemise de ce cannonnier, restée dans le trajet de la plaie que l'on pansa avec les émolliens. Le blessé éprouva d'abord des douleurs vives à l'occiput, de la pesanteur, et un engourdissement dans les membres inférieurs; la vue et l'ouïe s'affaiblirent au point qu'il pouvait à peine distinguer les gros objets, et entendre les sons les plus aigus. Les testicules se réduisirent, et tombèrent dans un état d'atrophie; le membre viril se flétrit aussi, et resta sans action. Cependant les plaies se détergèrent; les accidens locaux se disipèrent, et le blessé se trouva guéri avant le cinquantième jour.

René Bigot, chasseur à cheval, d'une forte constitution, et très passionné pour les femmes, avait reçu, au même combat de Benevente, un coup de sabre qui avait coupé la peau et toute la portion convexe ou saillante de l'occipital jusqu'à la dure-mère, dont une portion avait été entamée. On voyait le lobe droit du cervelet à travers l'ouverture de la dure-mère. Le plus léger attouchement sur cet organe causait des vertiges, des syncopes et des mouvemens convulsifs, sans qu'il donnât le moindre signe de douleur. M. Larrey détacha la portion osseuse de l'occipital, laquelle était restée adhérente au lambeau qu'il appliqua doucement sur l'excavation du crâne, ayant eu soin de faire une incision à la base de ce lambeau pour favoriser l'issue des fluides. La portion correspondante à l'ouverture de la dure-mère, ne contracta point d'adhérence, à cause d'un suintement qui n'avait cessé de se faire de l'intérieur du crâne, où d'ailleurs il n'y avait point d'épanchement. Ces fluides sortaient, à chaque pansement, par petites bulles qui produisaient un léger sifflement, que l'on attribua à l'air extérieur qui entrait et sortait par lar même ouverture.

Dès les premiers jours, le blessé perdit la vue et

l'ouïe du côté droit. Il éprouvait, en même temps, des douleurs vives sur le trajet de l'épine dorsale, et une sorte de fourmillement dans les testicules qui diminuèrent sensiblement, et furent réduits, surtout celui du côté gauche, au volume d'une fève de marais en moins de quinze jours. Bientôt après il perdit l'idée ou le souvenir des jouissances qu'il avait goûtées auprès d'un grand nombre de femmes.

Il avait très bien supporté le voyage de Benevente à Valladolid. D'ailleurs la plaie était en fort bon état, et donnait des espérances de guérison, si l'on excepte que les fonctions de la vue, de l'ouïe et de la génération paraissaient abolies pour toujours, lorsque des symptômes d'inflammation se déclarèrent et allèrent en augmentant progressivement, malgré les moyens qu'employa M. Larrey pour les combattre. Les douleurs de la tête et de l'épine faisaient jeter au malade des cris lugubres. Il était constamment couché dans son lit, sur le côté droit. Le moindre movement lui donnait des convulsions, et lorsqu'il se levait pour prendre du bouillon ou quelque médicament, il tombait dans des syncopes effrayantes.

M. Larrey fit appliquer un large vésicatoire à la tête ; il prescrivit les boissons rafraîchissantes, et tout ce qui était indiqué ; mais le mal empira de plus en plus, et le blessé mourut dans un état tétanique, le 7 février 1809, trente-huit jours après l'accident arrivé le 29 décembre 1808.

L'autopsie cadavérique fit reconnaître les symptômes suivans : il y avait eu une grande déperdition de substance à l'occipital ; l'ouverture dont nous avons parlé à la partie de la dure-mère, correspondante au lobe droit du cervelet qui était affaissé, était de couleur jaunâtre, sans suppuration ni épanchement ; les moelles allongée et épinière étaient d'un blanc terne, d'une consistance plus ferme que dans l'état naturel, et réduites d'un quart de leur volume ; les nerfs qui en émanent parurent également atrophiés.

Baptiste Vallet, âgé de quarante ans, d'une constitution athlétique, soldat au 5e. régiment d'infanterie de la garde, entre à l'hôpital du Gros-Caillou le 28 août 1821, atteint d'hémiplégie complète de tout le côté droit du corps; le membre superieur ne conservait aucun mouvement et était privé de sa sensibilité. L'inferieur pouvait encore un peu servir à la marche, quoique d'une manière pénible. Cette hémiplégie reconnaisait pour cause une chute faite de cinq pieds de haut, il y avait environ un mois, sur la partie latérale gauche et antérieure de la tête. La céphalalgie, premier résultat de cette chute, avait pris en quelques jours une telle intensité que Vallet avait été contraint d'entrer à cette époque à l'hôpital, et avait été placé dans les salles des fiévreux. Des bains de jambes sinapisés, une saignée, six sangsues aux tempes, un vésicatoire au bras droit, avaient été les moyens mis en usage. La céphalalgie avait en effet cédé à l'influence de ces moyens; l'hémiplégie, qui ne commençait que de se développer, ne fut point combattue. D'ailleurs le malade était sorti quinze jours après son entrée, dans l'espérance que la marche, l'exercice, un air plus pur, pouvaient lui être favorables. Cet espoir ayant été deçu, car à l'hémiplégie qui s'était prononcée de plus en plus, il s'était joint un trouble et une faiblesse notables dans la vue de l'œil droit, un commencement de paralysie dans la langue, et une difficulté assez grande dans la prononciation; Vallet rentra alors, comme nous l'avons indiqué, le 28 août, et fut placé dans les salles des blessés.

M. le baron Larrey, après un examen attentif de ce sujet, reconnut une exubérance contre nature dans la région latérale gauche et supérieure du crâne. Quelques questions faites au malade, relatives aux causes de ces phénomenes, amenèrent Vallet à parler de sa chute. Dès-lors M. Larrey reconnut facilement que tous les accidens que le malade avait présentés et présentait encore, étaient dus à la commotion du cerveau et à l'altération des os du crâne, des méninges, et sans

doute de la masse encéphalique. Il se détermina en conséquence à attaquer le mal à sa source même. Après avoir fait désemplir les vaisseaux cérébraux au moyen d'une saignée à la veine jugulaire, il fit raser entièrement la tête et appliquer un large vésicatoire sur tout le côté gauche de cette partie. Quatre jours après, Vallet allait déjà mieux; les doigts avaient repris quelques-uns de leurs mouvemens, l'avant-bras commençait à se fléchir sur le bras. Un second et un troisième vésicatoires appliqués à quelque distance d'intervalle, une huitaine de jours, entretinrent ce mieux sensible; quelques pillules de calomel, une potion de valériane pour la nuit, des frictions d'huile de camomille camphrée sur les membres paralysés, étaient les autres moyens qu'on employait. Le 17 septembre, un premier moxa fut appliqué sur les parties latérales et supérieures du cou, et quelques jours plus tard on établit deux exutoires au moyen de la potasse, un de chaque côté de la base du crâne, entre les apophises mastoïdes et les bosses occipitales supérieures. Les mouvemens des extrémités furent alors à moitié rétablis, le malade pouvait se lever, marcher librement et prendre tout l'exercice nécessaire au maintien de cette amélioration. La parole restait encore un peu embarrassée; les mots où se recontraient desir, étaient ceux qu'il prononçait le plus parfaitement et qu'il choisissait pour ainsi dire instinctivement. Déjà chez plusieurs autres malades atteints d'affections cérébrales de cette nature, nous avions remarqué ce choix de mots et cette plus grande facilité à les prononcer. Plusieurs autres moxas, au nombre de dix ou douze, ont été appliqués successivement et à des distances convenables sur le trajet des branches du nerf facial et des paires cervicales qui vont former le plexus brachial droit, pour achever la guérison. Elle eut lieu en effet vers le commencement de novembre, mais elle n'était point encore assez consolidée pour qu'on ne craignît pas le retour de l'hemiplégie. Néanmoins Vallet qui était d'un caractère

obstiné, et chez qui d'ailleurs l'intellect était peu développé, content de sa situation présente, ne voulut pas continuer à supporter l'application de nouveaux moxas, et se livra à l'intempérance ; quelques jours après, il fut puni de son entêtement et de son inexactitude à suivre le régime prescrit ; la paralysie revint accompagnée d'un embarras gastrique. On fit de nouveau raser la tête et appliquer un large vésicatoire ; une potion avec l'huile de ricin fut administrée, un scruple d'acétate d'ammoniaque fut ajouté dans une potion anti-spasmodique, de nouveaux moxas furent appliqués à la base du crâne du côté opposé à la paralysie et sur les paires cervicales du même côté. Cette rechute fut encore combattue avec succès par ces moyens, et la force étant tout-à-fait revenue dans les extrémités droites, le malade sortit enfin le 19 octobre, parfaitement guéri.

Quatre mois après, nous apprîmes que Vallet, rentré depuis quelque temps à l'hôpital dans la division des fiévreux, pour une affection catharrale avec céphalalgie et adynamie générale, y était mort le 7 février. Le lendemain on fit l'ouverture de son corps.

Le crâne scié circulairement et enlevé avec précaution, nous observâmes que le côté gauche de cette voûte était moins profond que le droit. La surface de la dure-mère légèrement injectée et d'une teinte jaunâtre offrait les traces d'une inflammation chronique. L'arachnoïde était saine ; soulevée à l'aide d'un chalumeau, on distinguait très bien que cette membrane n'était nullement enflammée ; ce qu'on aurait pu croire sans cette précaution, car à la première vue on voyait une injection très belle, une inflammation très prononcée, mais qui appartenaient l'une et l'autre à la pie-mère et non à l'archnoïde, dont la présence semblait disparaître sous une teinte aussi rouge. Tous les principaux vaisseaux étaient très distendus et gorgés de sang noirâtre. En soulevant le cerveau de la base du crâne, on aperçut le nerf optique droite plus gros, plus dense que le gauche ; il était aussi d'une couleur

rougeâtre; un tubercule stéatomateux en suppuration entourait l'artère basilaire avant sa bifurcation, et rendait son diamètre plus petit. Ce tubercule avait même contracté un point d'adhérence sur le pont de varole. Toute la substance médullaire du cerveau, principalement de l'hémisphère gauche, était engorgée, d'une consistance plus ferme et d'un aspect plus gris que l'état naturel. L'hémisphère droit se rapprochait davantage de cet état par sa mollesse et sa blancheur. Dans la protubérance annulaire même, le côté gauche était également plus dense que le droit, il ne cédait que très difficilement à de forts degrés de pression. Les circonvolutions du cerveau étaient aussi plus profondes et plus minces á gauche.

Quand on eût achevé l'examen du cerveau et qu'on porta ses regards sur la base du crâne, on fut frappé de l'extrême différence que présentaient les fosses moyennes; la droite était presque de moitié plus large que le gauche; les fosses antérieures avaient une différence bien moins prononcée. Quant aux fosses postérieures, celles qui logent le cervelet, leur petitesse et leur peu de profondeur excitèrent l'étonnement; elles engagèrent à remarquer le cervelet et les organes génitaux pour voir quels rapports existaient entre eux. Les deux lobes du cervelet, d'une égale forme, étaient en effet de la moitié moins volumineux qu'on ne l'observe ordinairement chez un sujet de la même grandeur, et les testicules réduits au volume d'une fève de haricot, n'offraient presque aucune consistance. Le pénis n'avait que six lignes de longueur. (La tête de Vallet qu'on prépare en ce moment, sera remise à M. le docteur Gall.)

La cavité thorachique nous a aussi présenté des phénomènes intéressans et analogues à ceux des os du crâne. La cavité droite etait beaucoup plus petite que la gauche; le poumon de ce côté était très petit, adhérent aux deux côtés et dans un état d'inflammation récente; le foie, très volumineux, montait dans cette cavité et avait dû contribuer encore à rapetisser

le poumon de ce côté. Le droit au contraire était très ample, ainsi que la cavité qui le contient. Le cœur avait un volume ordinaire, les oreillettes étaient gorgées de sang. L'abdomen n'offrait aucun état d'altération.

M. le baron Larrey attribue la réduction osseuse qu'on a remarquée à l'influence, à l'action énergique des topiques révulsifs appliqués, et sur l'emploi desquels on a insisté le plus long-temps possible, puisqu'à l'entrée de Vallet à l'hôpital, cette partie gauche du crâne offrait au contraire une exubérance manifeste. Cette assertion a été d'ailleurs discutée et prouvée par cet habile praticien dans de semblables circonstances et dans d'autres affections cérébrales, l'épilepsie par exemple.

Le docteur Thouvenelle m'a communiqué un cas de blessure tout semblable, et qui eut les mêmes suites.

Je fais observer encore ici que chez Bigot, c'est surtout le testicule gauche, qui s'atrophia, au point de se réduire aux dimensions d'une fève de marais, tandis que c'est l'hémisphère droit du cervelet qui avait été lésé. M. Larrey me fit voir des blessés semblables, dans l'hôpital de la garde, et me donna deux crânes dans lesquels la marque des coups de sabre sur les fosses occipitales atteste la lésion du cervelet ; chez tous ces sujets, il y avait eu atrophie et ramollissement des testicules.

Je vais rapporter encore un exemple fort remarquable, quoique je n'ose das décider ce qui, dans ce cas, a souffert le premier, des testicules ou du cervelet. Un garçon de treize ans se livrait depuis quelque temps à l'onanisme avec tant de fureur, que tous les moyens que l'on employa pour le corriger de ce vice, furent infructueux ; enfin il fut attaqué d'une incontinence d'urine et de vomissemens très opiniâtres. Dès le commencement de sa maladie, il ne se traînait qu'à peine, et au bout de quelques mois il fut paralysé des extrémités inférieures, sa pupille perdit la faculte de se

contracter; pendant long-temps il y voyait encore un peu vers l'angle interne des yeux, mais il finit par perdre complétement la vue; des convulsions ne tardèrent pas à se manifester autour des yeux et de la bouche. La paralysie devint complète, les poumons mêmes perdirent leur action, et il mourut suffoqué. A l'autopsie je trouvai plus d'une livre d'eau limpide dans les cavités cérébrales. L'un et l'autre lobe du cervelet étaient remplis de plus à l'intérieur; cependant la suppuration avait fait bien plus de ravages dans le lobe gauche que dans le droit. La commissure des deux lobes du cervelet (le pont), était singulièrement diminuée par l'atrophie, et d'une couleur jaunâtre. L'un et l'autre testicule étaient trés petits; celui du côté droit avait presque entièrement disparu, et était d'une consistance très molle: donc ici encore coïncidence entre la lésion des deux côtés opposés.

Il existait, dans la famille de ce jeune homme, une disposition héréditaire à l'hydropisie cérébrale. Je suis persuadé que l'eau trouvée dans les cavités encéphaliques n'était en liaison avec l'onanisme, qu'autant que sa présence avait augmenté l'irritabilité et la sensibilité de tout le système nerveaux.

La suppuration du cervelet devait aussi être établie depuis long-temps, car le pus avait plutôt l'apparence d'un putrilage purulent, que d'un pus de bonne qualité. C'est donc une question de savoir si ce n'est pas l'état maladif du cervelet qui a entraîné à l'onanisme ce jeune homme, d'ailleurs fort raisonable et très bien élevé. Faut-il admettre au contraire que c'est l'onanisme qui a causé la maladie du cervelet? Quoi qu'il en soit, ce cas prouve l'influence que les parties génitales et le cervelet exercent réciproquement l'un sur l'autre.

De tout ce que je viens de dire, il résulte que les maladies et les lésions du cervelet ont, sur les parties génitales, une influence aussi bien prouvée que l'est l'influence des maladies et des lésions de ces dernières sur le premier: il paraîtrait même que la vie

du cervelet est plus indépendante que celle des parties génitales.

Influence des maladies du cervelet sur les parties génitales, et principalement sur l'instinct de la propagation. Manie érotique.

Je traiterai cette matière sous un double point de vue ; mon intention est, 1. de donner des preuves nouvelles en faveur de la connexion immédiate qui existe entre le cervelet et les parties sexuelles, ainsi que l'instinct de la propagation ; et 2. de mettre au jour la vraie cause et la véritable origine de la manie érotique.

Il est certaines maladies des parties génitales, qui bien qu'elles occasionnent une violente irritation dans ces organes, n'ont aucune influence sur l'instinct de la propagation. Les inflammations les plus violentes de ces parties provenant de causes extérieures, ne sont jamais accompagnées ni de manie, ni de désirs amoureux. Lorsqu'une acrimonie dartreuse se porte sur ces organes, soit chez des hommes, soit chez des femmes, elle y produit bien une chaleur brûlante et douloureuse, et une démangeaison insupportable, mais elle n'excite point de désirs. J'ai vu, dans les maladies du bas-ventre, par exemple du foie, des reins, les malades avoir, pendant des semaines entières, de violentes érections qui faisaient leur tourment, loin de provoquer le moindre désir amoureux.

M. Fodéré rapporte qu'a la suite d'une piqûre d'insecte, un homme eut de violentes érections, sans la moindre sensation voluptueuse.*

Aucune de ces observations ne peut être nouvelle pour les médecins expérimentés. Comment se fait-il donc qu'ils soutiennent presque tous, avec Cabanis, que les parties sexuelles sont souvent le siége de l'aliénation mentale ? †

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* Sur le Délire, t. I, p. 316.
† Sur le rapport du physique et du moral, etc. t. I. p. 107.

Un jeune homme, robuste et plétorique, était arrivé depuis quelque temps à Vienne. Faute de liaisons, il vivait dans une plus grande continence que de coutume, et il tomba brusquement dans une manie érotique ; il avait des érections long-temps continuées ; ses testicules étaient enflés et douloureux. Qu'y avait-il de plus naturel, suivant les idées recues en médecine, que de chercher la cause de sa maladie dans l'inflammation des parties génitales? Aussi employa-t-on tous les moyens pour combattre l'inflammation locale, et pour faire cesser la surirritation des organes générateurs: mais le malade n'en resta pas moins dans le même état pendant trois semaines. Lorsque je fus appelé, je rendis mes collègues attentifs à l'inflammation du cerveau, et surtout du cervelet. Nous concertâmes notre plan curatif; en conséquence de cette idée, et en peu de jours, l'inflammation et l'enflure des parties sexuelles, ainsi que la manie, avaient disparu.

L'on peut admettre, sans balancer, que lorsqu'un état maladif des parties génitales est accompagné de manie, ces parties ne sont malades que secondairement ou par sympathie, et que le siége du mal est dans le cerveau, ou, si la manie est en particulier du genre érotique, dans le cervelet. Avant de prouver cette assertion par un tableau fidèle de la manie érotique, je ferai quelques observations sur l'origine de cette maladie.

Un jeune homme très bien élevé et rempli de talens, qui depuis son enfance s'était senti violemment entraîné aux idées érotiques, les maîtrisait jusqu'à un certain point, à l'aide de son penchant également décidé à la dévotion. Lorsque ses relations sociales lui eurent permis de se livre sans contrainte aux plaisirs de l'amour, il ne tarda pas de s'apercevoir, avec une espèce d'effroi, que souvent il lui devenait très difficile de détourner son attention des images voluptueuses qui le poursuivaient, pour la porter sur les affaires importantes et souvent pressées de son état. Tout son être était absorbé par la sensualité. Pour ne

pas succomber tout-à-fait, il se trouvait forcé de s'occuper assidûment d'objets scientifiques, ou de se créer quelque nouvelle occupation favorite ; son cervelet est d'une grandeur peu ordinaire.

Une dame très spirituelle était tourmentée, également, depuis son enfance, par les désirs les plus désordonnés; l'education très soignée qu'elle avait reçue, fut seule capable de la sauver des démarches les plus inconsidérées auxquelles la portait la violence de son tempérament. Lorsque dans un âge plus mûr, elle se trouva abandonnée à elle-même, elle essaya tout pour satisfaire ses désirs brûlans mais la jouissance ne paraissant que les irriter. Souvent elle se vit sur le point de tomber dans la manie. Réduite au désespoir, elle abandonna sa maison, quitta la ville, et se réfugia chez sa mère, dans une campagne isolée, où le défaut d'objets, la plus grande sévérité de mœurs, et les soins du jardinage, prévinrent l'éclat du mal. Après avoir habité de nouveau, pendant quelque temps, une grande ville, elle se trouva menacée d'une rechute, et elle se réfugia une seconde fois auprès de sa mère. A son retour elle vint me trouver à Paris, et se plaignit à moi comme une femme au désespoir. Partout, me dit-elle, je ne vois que les images les plus lubriques; le démon de la luxure me poursuit saus relâche en tous lieux, à table, dans mon sommeil même : je suis un objet de dégout pour moi-même ; oui, je le sens, je le puis plus échapper á la manie ou à la mort.

Je lui fis, en abrégé, l'histoire naturelle de l'instinct de la propagation ; je la rendis attentive à la forme de sa nuque. Qoinque sa tête soit tres grande, le diamètre de sa nuque surpasse la distance d'une oreille à l'autre. Elle conçut la cause de son état ; je lui conseillai de continuer son voyage pour aller rejoindre sa mère, de varier ses occupations pour diminuer l'activité de son cervelet; de se faire souvent appliquer des sangsues à la nuque, pour modérer l'état d'irritation de cet organe, d'éviter tous les mets échauffans et toutes les boissons irritantes, etc.

Une homme avait vécu plusieurs années dans un mariage très bien assorti, dont il était né plusieurs enfans, et il avait acquis, par son activitè, une fortune honnête. Lorsqu'il se fut retiré des affaires, et qu'il mena une vie oisive, son penchant inné dominant gagna peu a peu le dessus. Il s'abandonna tellement à ses désirs, que jouissant encore de sa raison, il regardait toute femme comme une victime destinée à satisfaire sa sensualité. Du moment où il apercevait de la fenêtre une personne quelconque du sexe, il annonçait en toute hâte, et avec l'accent de la joie, à sa femme et à ses filles, le bonheur qui l'attendait. A la fin, cette manie partielle dégénéra en manie générale, et peu aprés il mourut dans l'hospice pour les aliénés de Vienne. Son crâne prouve que son cervelet avait acquis un développement très considérable, (Pl. XL. I. I. I. I.)

M. Pinel rapporte un exemple tout semblable : "Un homme, dit-il, avait rempli, avec éloge, jusqu'a sa cinquantième année, des fonctions publiques. Il s'excite alors une ardeur immodérée pour les plaisirs vénériens; son regard est vif et animé ; il fréquente des lieux de débauche, se livre à tous les excès, et revient tour-à-tour dans la société de ses amis, leur peindre les charmes d'un amour pur et sans taches. Son égarement augmente par degrés, et on est obligé de le tenir enfermé. La solitude exalte son imagination fougueuse ; il peint en traits de feu les plaisirs qu'il a goûtés avec ce qu'il appelle des beautés célestes ; il s'extasie en parlant de leurs grâces et de leurs vertus ; il veut faire construire un temple à l'Amour, et se croit lui-même élevé au rang des dieux : ce furent-là les préludes d'une fureur violente avec délire."*

On voit, par ces exemples, que les personnes dont le cervelet a acquis un développement plus qu'ordinaire, ont une disposition naturelle à la manie érotique ; mais ces exemples montrent aussi que l'extrême ac-

* De l'aliénation mentale, deuxième édition, page 15 et 16, § 18.

tivité de cet organe ne la produit réellement que dans le cas où les personnes chez qui cette disposition a lieu, se livrent exclusivement aux jouissances de l'amour physique ; tant il est sûr que les fréquentes jouissances ne sont point un remède contre cette espèce de manie.

Dans les hospices, nous avons trouvé constamment le cervelet très développé chez tous les sujets attaqués de manie érotique, et chez tous ceux qui étant atteints d'une manie totale, se livraient irrésistiblement à l'onanisme.

M. Esquirol nous fit voir le plâtre d'une femme qui avait été attaquée de manie érotique. Les bosses occipitales très saillantes annoncent un cervelet extraordinairement développé.

Il en est cependant de cet organe comme de toutes les autres parties : non-seulement une activité excessive dont il est doué primitivement, peut dégénérer en manie, c'est-à-dire en une activité tellement forte, qu'elle n'est plus soumise à l'empire de la volonté ; mais d'autres causes encore peuvent exalter l'action du cervelet, au point qu'il en résulte une manie érotique, même chez des personnes qui, suivant la marche ordinaire de la nature, n'y étaient pas disposées.

Ne voit-on pas, dans des maladies aiguës, des sujets qui n'avaient auparavant aucune disposition à être métromanes ou querelleurs, faire des vers et chercher dispute à tout le monde ? Ces cas, il est vrai, sont fort rares, et toujours l'historie de la vie antérieure du malade, jointe à la conformation de son cervelet, pourra donner l'explication du phénomène, et décider le médecin à avoir égard dans le choix de sa méthode curative, plus particulièrement aux causes accidentelles, ou à la disposition naturelle, à des dérangemens généraux, ou à un dérangement partiel.

Je place ici le tableau que fait M. Pinel de la manie érotique, tant parce qu'il confirme ce que j'ai dit jusqu'ici de cette maladie, que parce que M. Pinel lui-même, qui cependant ne paraît attribuer ce genre de manie qu'à une espèce d'effervescence qui aurait lieu

dans les parties sexuelles, est obligé d'en revenir à une disposition particulière.

"C'est dans l'un et l'autre sexe une effervescence physique des organes générateurs, avec les gestes les plus lascifs, et les propos les plus obscènes ; elle tient d'autant plus à la disposition intérieure, qu'elle ne dure qu'autant que la maladie ; et j'ai vu les personnes les plus recommandables par la pureté de leurs mœurs, éprouver, pendant un temps déterminé de leur état maniaque, ce rapprochement malheureux avec des femmes de débauche ; puis revenir, lors de leur convalescence, à leur caractère primitif de réserve et d'une extrême décence. J'ai vu cette affection se développer dans des cas extrêmes de la manière suivante ; d'abord gaîté insignificante, regard animé, recherche voluptueuse dans la toilette, curiosité inquiète, tremblement des mains, douleurs sourdes à la matrice, chaleur brûlante dans l'intérieur des seins, mobilité extrême des yeux, impatience ; l'accès est alors à son plus haut degré ; babil rempli de mots sales et de propos obscènes, vociférations, gestes provocateurs, et mouvemens du corps les plus lascifs, tous les emportemens effrénés, et les illusions d'un délire érotique. Cette fougue impétueuse cède à une répression rendue nécessaire, et il succède un morne repos, ou plutôt un état de lassitude : la maigreur est alors extrême, et cette fureur interne amène l'épuisement, la stupeur et la démence ; l'embonpoint se rétablit par degrés. La maladie devient quelquefois périodique, et la vie se passe dans une alternative d'un égarement érotique, et de l'apathie la plus stupide." *

Le tableau qu'on vient de lire, nous conduit naturellement à cet état d'irritation du cervelet, qui entraîne les maladies connues sous le nom de satyriasis, de priapisme et de nymphomanie. Quelque divers que puissent être les idées déréglées et les sentimens extravagans qui accompagnent ces maladies, ils ont

* De l'aliénation mentale, deuxième édition, p. 67, § 78.

toujours pour pivot l'instinct de la propagation, et ce genre d'aliénation doit être rangé, par conséquent, dans la classe de la manie érotique. Comme l'on cherchait uniquement la source de ce mal dans les parties sexuelles, l'on n'a indiqué, d'ordinaire, d'autre remède que la castration. Par cette mutilation, l'activité du cervelet se trouve affaiblie; et c'est pour cela que le mal diminue quelquefois après l'opération. Mais ce moyen n'a certainement pas toujours un effet utile; car dans les grandes maisons publiques de fous, comme l'a déjà remarqué Cabanis, on voit assez souvent ces malheureux s'arracher les testicules, sans qu'il résulte de-là le moindre changement dans l'état du cerveau. Je veux bien qu'à défaut de meillure méthode curative l'on continue, dans ces cas, de couper les étalons; mais lorsque dans notre espèce il y a encore possibilité de guérison, on l'obtiendra certainement avec moins d'inconvéniens par une méthode curative dans laquelle on aurait uniquement égard à l'état du cerveau, et surtout du cervelet.

L'on parle beaucoup d'une manie, produite ou par une trop grande continence, ou par des émissions excessives de la liqueur séminale.

Une trop grand continence, supposé qu'elle ait lieu réellement, peut, sans contredit, occasionner des maladies inflammatoires, et surtout une inflammation et une surirritation du cervelet et du cerveau entier, et produire, par conséquent, la manie érotique aiguë, ou une manie générale.

Cabanis impute les accidens qui résultent d'une continence trop sévère, tantôt à l'état des organes de la génération, tantôt à un état maladif du cerveau. S'il avait connu l'influence réciproque du cervelet sur les parties sexuelles, et de celles-ci sur le cervelet et sur le cerveau, il n'aurait certainement pas hésité entre ces deux opinions. Les dispositions extraordinaires de l'esprit, les affections et les penchans singuliers, et les bizarreries qui surviennent chez les jeunes filles et les jeunes garçons mobiles et délicats,

quand les appétits nouveaux sont trop long-temps contrariés, auraient dû le mettre sur la voie. Et lorsqu'il dit que rien n'est moins rare que de voir des femmes acquérir, dans leurs accès de vapeurs, une pénétration, une élévation d'idées, une éloquence qu'elles n'avaient pas naturellement, ne devait-il pas, en bon logicien, se décider pour le cerveau ?

Il cite même, d'après Buffon, l'histoire célèbre d'un curé qui, par l'effet d'une chasteté rigoureuse, était tombé dans un délire vaporeux voisin de la manie. Pendant tout le temps que dura ce délire, le malade déploya divers talens qui n'avaient pas été cultivés en lui. Il faisait des vers et de la musique ; et, ce qui est encore bien plus remarquable, sans avoir jamais touché de crayon, il dessinait avec beaucoup de correction et de vérité les objets qui se présentaient à ses yeux. La nature le guérit par des moyens très simples. Mais quoiqu'il restât toujours homme d'esprit, il avait vu s'évanouir, avec sa maladie, une grande partie des facultés merveilleuses qu'elle avait fait éclore. Qui oserait faire dériver d'un état des parties da la génération la poésie, la musique et l'art du dessin ?

La maniaque dont parle M. Pinel, paraît avoir été dans le même cas.

"C'est quelquefois, dit-il, un excès opposé, c'est-à-dire, des penchans vivement irrités, et non satisfaits, qui peuvent aussi jeter dans un égarement complet de la raison. Une mélancolie tendre, et des inquiétudes vagues, dont l'objet n'était ni méconnu, ni dissimulé, distinguèrent à vingt ans une personne douée d'une constitution forte et d'une vive sensibilité ; tout concourait à enflammer son imagination : lecture assidue des romans les plus galans, sorte de passion pour toutes les productions des arts dans le genre érotique, fréquentation habituelle de jeunes gens des deux sexes, dont les uns la charment par des agrémens personnels et toute la séduction de la galanterie, les autres par des exemples dangereux et des confidences indiscrètes,

La coquetterie la plus raffinée est érigée alors en principe, et devient une occupation sérieuse, son orgueil, flatté des moindres prévenances, les lui fait regarder comme un triomphe assuré, dont elle ne cessait de s'entretenir ou de faire l'objet de ses rêveries, jusqu'à ce qu'une nouvelle aventure fit oublier la première. Une faute paraissait inévitable, ou du moins très à craindre; et les parens se hâtent de conclure un mariage fondé sur certaines convenances. L'époux choisi était d'un âge mûr, et malgré les avantages de sa stature et d'une complexion forte, peut être moins propre à satisfaire qu'à irriter ses désirs. La mélancolie de la jeune dame dégénère en une sombre jalousie, et elle attribue à des infidélités ce qui n'était que l'effet de la débilité des organes. Une sorte de dépérissement succède, les traits s'altèrent, et il se déclare un babil intarissable, avec le plus grand désordre dans les idées, prélude ou plutôt signe manifeste d'une manie déclarée." *

Mais il est bien rare, je crois, que la continence soit poussée au point de produire de pareils effets. La nature a tant de moyens de diminuer la trop grande abondance de la liqueur séminale, même sans le concours de l'individu, que ce genre d'aliénation ne doit être à craindre que très rarement. Croyez-en celui qui sonde les cœurs et les reins; *il n'est pas bon que l'homme soit seul.* Souvent on articule comme cause d'une maladie, une continence excessive, lorsqu'on ne devrait en chercher la cause que dans une débauche secrète. Un évêque qui édifiait son diocèse par une vie exemplaire, tomba, vers sa soixantième année, dans une mélancolie accompagnée d'une faiblesse d'esprit manifeste. Tout le monde déplorait le malheur si peu mérité du saint homme; il mit sa confiance en moi; je sortais souvent avec lui, tant à pied qu'en voiture; toutes les fois que nous rencontrions une jeune fille, il soupirait profondément; aussi souvent qu'il

* Sur l'Alienation mentale, deuxième édition, p. 47 et 48, § 58,

voyait un couple heureux, il me serrait la main avec chaleur, en s'écriant: "Quelle est leur félicité!" J'allai au-devant des aveux qu'il pouvait avoir à me faire: je l'entretins sur le ton de l'amitié, du bonheur que goûtent des époux dans un mariage bien assorti, de l'intention du Créateur empreinte dans toutes les œuvres de la création. Le voile tomba, et me laissa voir l'homme: le pieux évêque m'avoua qu'il était du nombre de ceux *qui pèchent sept fois par jour.*

Familiarisé avec les faiblesses humaines, je suis disposé bien plutôt à attribuer la manie érotique à des excès, qu'à une trop grande continence. Ces excès produisent une irritabilité et une excitabilité du cervelet telle, qu'il n'est plus au pouvoir de l'homme d'arrêter le torrent des idées lubriques et des images voluptueuses qui vient fondre sur lui. Mais comme la cause première agit avec d'autant plus de violence que les autres facultés de l'âme sont plus affaiblies, ce genre de manie dégénère bientôt en démence, et en faiblesse générale de tout le corps. Ici encore, je cite à l'appui de mon assertion un exemple rapporté par M. Pinel.

"Un jeune homme, d'une forte constitution, et né d'un père riche, avait atteint son accroissement complet vers la dix-huitième année de l'âge, et ce fut à cette époque de l'extrême effervescence de ses sens, qu'il commença à se livrer à ses penchans avec toute l'impétuosité d'un caractère ardent, et les facilitiés que lui donnait un rassemblement journalier de jeunes ouvrières dans une grande manufacture. Il prend alors l'habitude de s'adonner au plaisir sans frein et sans mesure, le plus souvent à diverses heures du jour et de la nuit; il fait succéder, à l'âge de vingt ans, d'autres excès non moins destructeurs; ceux de l'intempérance et de la fréquentation répétée des lieux de débauche. Des maux vénériens, tour-à-tour guéris et de nouveau contractés, viennent se joindre à l'épuisement, et se compliquer avec d'autres affections cutanées. Des objets de commerce rendent alors néces-

saires des voyages fréquens en chaise de poste, le jour, la nuit, et dans toutes les saisons de l'année. Les traitemens au mercure sont tour-à-tour commencés, suspendus, renouvellés, sans ordre et sans règle. Déslors les symptômes les plus marqués d'une hypochondrie la plus profonde; digestions laborieuses et très imparfaites; flatuosites incommodes, rapports acides, alternatives de resserrement ou de relâchement des intestins, douleurs vives de colique devenues périodiques: frayeurs sans cause, pusillanimité extrême, dégoût de la vie, et plusieures tentatives de commettre un suicide. Une crédulité aveugle et puérile dans la vertu des médicamens, et une confiance entière accordée a toute espéce d'empiriques, se joignent déjà, à vingt-cinq ans, à la nullité entière pour un plaisir dont il a abusé à l'excès, et à une décadence de la raison qui ne fait que s'accroître." *

Tous les exemples cités jusqu'ici, prouvent qu'aucune espèce de manie érotique ne peut avoir son siége dans les parties génitales elles-mêmes; qu'il faut de toute nécessité chercher la cause de ce dérangement là, où est celle de tous les dérangemens des facultés intellectuelles.

Or, comme le cervelet est l'organe de l'instinct de la propagation, c'est de lui que doivent dépendre les surirritations et les dérangemens de cet instinct.

J'expliquerai plus bas, en traitant des autres facultés fondamentales, comment il se fait que la manie érotique est accompagnée tantôt de dévotion, tantôt d'orgueil, tantôt d'un autre sentiment exalté.† Ici, je continue de fournir les preuves de mon assertion: que le cervelet est l'organe de l'instinct de la propagation, et j'en trouve de nouvelles dans les différentes manières dont cet instinct se manifeste dans l'idotisme.

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* Pinel, sur l'Alienation mentale, p. 172, § 169.
† Sur l'Alienation mentale, p. 46 et 47, § 57.

Observations sur l'activité ou l'inaction de l'instinct de la propagation dans l'idiotisme.

On a le préjugé que les idiots, les imbéciles et les crétins sont très lascifs, et en proie à tous les effets d'un tempérament lubrique. Supposé qu'il en soit réellement ainsi, je demande si les parties génitales de ces pauvres d'esprit, ont une conformation particulière ? si elles sont parvenues à un développement plus exubérant, si elles sécrètent une liqueur séminale plus irritante ? si elles sont capables de bercer l'imagination d'images lubriques plus vives ? L'on ne saurait soutenir aucune de ces assertions.

Du reste, il s'en faut de beaucoup que l'instinct de la propagation se manifeste d'une manière très active chez tous les idiots et chez tous les crétins. J'ai soigneusement examiné un grand nombre de ces individus, et voici le résultat de mes recherches.

Que les parties génitales soient grandes ou petites, elles n'ont jamais une influence déterminée sur l'instinct de la joissance vénérienne.

Cet instinct est sans activité, toutes les fois que le cervelet n'a acquis qu'un faible degré de développement. La sauvage de l'Aveyron, qui se trouve aux Sourds-Muets, à Paris, n'avait pas témoigné encore, à l'âge de seize ans, le moindre penchant pour les femmes ; aussi son cervelet était-il très faiblement développé. A Sálzbourg, le professeur Hartenkeil me fit voir un crétin âgé de vingt et quelques années, chez lequel l'instinct de la propagation ne s'était jamais manifesté en aucune manière, quoiqu'il fût assez bien fait, et qu'il jouît d'une bonne santé ; son cervelet était également trés peu développé. Dans une autre salle, au contraire, le même savant me montra une femme tellement contrefaite, qu'au lieu de marcher elle se traînait par terre : cette malheureuse se trouvait dans une espèce de ravissement toutes les fois qu'elle apperce-

vait un homme. A peine me fus-je approché d'elle, qu'elle grimpa sur son lit, et m'invita, par les gestes les plus lascifs, à l'y suivre; elle jeta même tous ses vêtemens pour me donner l'hospitalité d'une manière plus cordiale. Ses facultés intellectuelles sont de beaucoup inférieures à celles des brutes, mais son cervelet est très développé ; aussi tous ses mouvemens ne tendent-ils qu'à satisfaire sa lubricité dans la solitude même. Je pourrais rapporter un très grand nombre de cas semblable, qui tous confirment mon opinion; mais je me contenterai d'en rapporter encore quelques-uns, moins pour appuyer ma doctrine, que pour offrir au lecteur une observation morale.

Nous vîmes, à Munich, un garçon de quinze ans qui, dès sa septième année, avait voulu abuser de sa sœur, et avait manqué de l'étrangler parce qu'elle opposait de la résistance à ses désirs. Son idiotisme n'était pas des plus complets; il parlait un peu, reconnaissait les personnes, et trouvait, comme un chien, du plaisir à regarder les passans par une fenêtre. Son cervelet était extrêmement développé, aussi fallait-il soigneusement tenir éloignées de lui les femmes et les filles. A Paris, M. Savary, alors ministre de la police, et M. de Bourrienne, m'amenèrent un garçon âgé d'à-peu-près seize ans, qui ne voulait absolument rien apprendre, et dont la société devenait très pernicieuse à ses condisciples, non-seulement à raison de son défaut de susceptibilité pour l'instruction, mais encore à raison de ses goûts antiphysiques. Je rendis ces messieurs attentifs au développement très peu considérable de son front, qui expliquait l'invincible indifférence qu'il témoignait pour toute instruction; je leur fis remarquer en même temps ses bosses ocipitales très proéminentes, sa nuque large et robuste qui rendaient raison de ses désirs effrénés. L'idiotisme de se sujet était moins complet encore que celui du jeune homme de Munich, dont j'ai parlé tout-à-l'heure; ceci me conduit à faire encore une autre observation.

Dans plusieurs hospices pour les aliénés, et dans quelques maisons de correction, nous avons rencontré des sujets que l'on pretendait être devenus aliénés par suite d'émissions excessivement fréquentes de la liqueur séminale, ou que l'on vouloit punir de s'être livrés à l'onanisme.

Je suis bien loin de nier l'influence pernicieuse que l'onanisme exerce sur la manifestation des facultés intellectuelles, et plusieurs passages de mes écrits le prouvent suffisamment. Mais dans ces cas il faut d'ordinaire accuser une autre cause. La nature avait traité en marâtre, sous le rapport des facultés supérieurs, tous les sujets semblables que j'ai eu occasion d'observer. Chez eux, la partie anterieure du crâne était étroite et peu élevée, ou bien ils étaient plus ou moins hydrocéphales. Les parties postérieurs du crâne au contraire, leur nuque, leur cervelet, avaient acquis un degré de développement qui n'était dans aucune proportion avec celui des parties cérébrales affectées aux facultes intellectuelles supérieurs. L'homme ainsi organisé se trouve dans le cas de tout animal lascif; c'est un singe en chaleur. L'organe de l'instinct de la propagation le domine impérieusement, parce qu'aucun autre organe ne peut balancer l'activité du premier. Rien ce que nous appelons décence, mœurs, religion, ne peut agir sur un tel individu ; les punitions ne sauraient l'effrayer ; rien ne saurait engager à se contraindre un être ravalé au-dessous de la brute, et qui n'a pas de volonté. L'observateur philosophe reconnaît ici que la faiblesse de l'entendement est la cause de l'abandon à une sensualité brutale, tandis que, dans son erreur, le vulgaire regarde la faiblesse de l'intendement, comme une suite de l'abandon à la sensualité.

L'instinct de la propagation survit à la destruction des parties génitales, et subsiste dans l'absence de ces parties.

Une femme mariée qui mourut d'un cancer à la matrice s'était prostituée pendant la durée de sa longue maladie. Peu avant sa mort, elle exigea les approches de son mari. Une dame fut en proie pendant plus de deux ans à une maladie extrêmement douloureuse ; ce n'etait déjà plus qu'un squelette ; des écoulemens abondans et infects, une cruelle dysurie, etc., annonçaient sa mort prochaine. Malgré tout cela, quoique son état rendit absolument impossible toute approche maritale, elle désirait avec une ardeur voluptueuse les embrassemeus d'un époux qu'elle chérissait. Apres samort, arrivée peu de jours plus tard, je trouvai le vagin, la matrice et la vessie, en partie dissous en un liquide ichoreux et infect, en partie tellement rougés que les membranes et les fibres se déchiraient au moindre attouchment.

A Vienne, je donnai des soins à l'épouse d'un fabricant, laquelle, tant au physique qu'au moral, vivait avec son mari dans l'union la plus heureuse, quoiqu'elle n'eût jamais été réglée. Comme elle ne devenait jamais enceinte, et qu'elle désirait avoir des enfans, on examina sa conformation avec soin et à plusieurs reprises. La sages-femmes, ni l'accoucheur, ne purent jamais découvrir d'utérus.

M. Richerand cite aussi quelques exemples de femmes ayant le même vice de conformation, et qui malgré cela avaient du penchant pour les plaisirs de l'amour.

"L'utérus, dit-il, imprime-t-il au sexe toutes ses modifications distinctives, et doit-on dire avec Van Helmont ; PROPTER SOLUM UTERUM MULIER EST QUOD EST ; *c'est par la matrice seule que la femme est ce qu'elle est?* Quoique ce viscére réagisse sur tout le systéme féminin d'une maniére bien évidente, et semble soumettre à son empire la somme presque entière

des actions et des affections de la femme, nous pensons qu'il n'est pas à beaucoup près la cause unique des caractères qui la spécifient, puisque ces caractères sont déjà reconnaissables dès les premiers temps de la vie, lorsque le système utérin est loin d'être en activité. Une observation* très curieuse, consignée par le professeur Caillot, dans le second volume des Mémoires de la société de Paris, prouve mieux que tous les raisonnemens qu'on pourrait accumuler, jusqu'à quel point les caractères du sexe sont indépendans de l'influence de l'utérus. Une femme naît, croît et s'élève avec toutes les apparences extérieures de son sexe; arrivée à l'âge de vingt à vingt un ans elle veut obéir au penchant qui l'entraîne: vains désirs! efforts superflus! elle n'avait rien au-delà de la vulve d'ailleurs bien conformée. Un petit canal dont l'orifice n'offrait que deux lignes ou deux lignes et demie de diamètre, tenait la place du vagin, et se terminait en cul-de-sac à un pouce de profondeur. Les perquisitions les plus exactes faites en introduisant une algalie dans la vessie urinaire, et le doigt indicateur dans le rectum, ne purent faire renconter l'utérus. Le doigt introduit dans l'intestin sentait distinctement la convexité de la sonde placée dans la vessie, de manière qu'il était évident qu'aucun organe analogue à l'utérus ne séparait le bas-fond de ce viscère de la paroi antérieure du rectum: la jeune personne n'avait jamais été sujette à l'évacuation périodique; aucune hémorrhagie ne suppléait à cette excrétion; elle n'éprouvait aucune des indispositions qu'occasionne la non apparition des règles; elle jouissait au contraire d'une santé florissante; rien ne lui manquait de tous les caractères de son sexe, seulement son sein était peu développé. Parvenue à l'âge de vingt-six à vingt-sept ans, elle est devenue sujette à des pissemens de sang assez fréquens." †

*On trouve dans les Œuvres de la Métrie, Système d'Epicure, § 14, une observation semblable et non moins intéressante.

† Nouveaux Elémens de Physiologie, septième édition, t. II. p. 392, § CXCV.

J'ai déjà parlé de l'instinct de la propagation subsistant encore lorsque les testicules ont été enlevés, et lorsque les fonctions de la matrice avaient complétement cessé.

Maladies particulières du cervelet.

J'ai eu occasion d'observer une maladie toute particulière du cervelet.

A Vienne, le comte Philippe H....., âgé de quarante et quelques années se plaignait, depuis quelques mois, de douleurs hémorrhoïdales; outre cela il éprouvait des nausées continuelles, une pression très désagréable dans la nuque, et une tendance à tomber en avant comme s'il voyait un précipice à ses pieds. Plusieurs médicins attribuèrent tous ces symptômes aux hémorrhoïdes; pour moi, j'en conclus qu'il existait un vice organique dans le cerveau. Quelques mois après, le malade mourut, et nous trouvâmes sur la tente (*tentorium*) une masse charnue de deux pouces de diamètre qui avait comprimé le cervelet. Plus tard, je lus, dans les ouvrages de Hahnemann, la description des mêmes symptômes; à l'autopsie cadavérique on avait trouvé le cervelet en pleine suppuration. A cette époque, je n'avais point encore fait attention à l'influence du cervelet sur l'instinct de la propagation, et sur les parties sexuelles.

Pour compléter les preuves de l'influence du cervelet sur les parties sexuelles, je vais copier les recherches sur les maladies organiques du cervelet, imprimées dans le *Journal de Physiologie expérimentale et pathologique*, par F. Magendie, membre de l'Institut, 1822, Nos. 2 et 3; par M. B. A. Serres, chevalier de la Légion-d'Honneur, l'un des médecins de l'hôpital de la Pitié, chef des travaux anatomiques des hôpitaux, etc.

Dans ce mémoire, M. Serres se propose de fixer l'attention des observateurs sur les apoplexies cérébel-

leuses. Comme toutes ses observations sont des preuves pathologiques du rapport qui existe entre le cervelet et l'instinct de la propagation, elles doivent faire partie de mon traité sur la fonction animale du cervelet.

Observation première.

Un homme âgé de trente-deux ans, fut apporté la nuit à l'Hôtel-Dieu, par la garde nationale de Paris, au mois d'avril 1814. Ceux qui conduisaient le malade nous apprirent qu'il avait été trouvé sur le quai avec des filles publiques, dont une, présente à sa réception, déclara que c'était dans l'acte du coït, et après avoir considérablement bu, que le malade était tombé dans l'état où nous le voyions.

La face était extrêmement rouge, la chaleur de la tête et du cou très élevée, le pouls était très fort et fréquent, quatre-vingt-dix pulsations par minute. La respiration était entrecoupée et lente, neuf, dix et onze inspirations par minute ; la somnolence était profonde, il ne donnait aucun signe de connaissance, et de temps en temps il était pris de mouvemens convulsifs et d'une roideur tétannique qui durait trois ou quatre minutes. En mettant le malade dans son lit, on s'aperçut qu'il était dans un état d'érection ; les parties génitales étaient dans un état de chaleur qui contrastait avec le froid des extrémités. On appliqua trente sangsues aux jugulaires, et on fit une large saignée du pied, qui ne produisirent aucun effet : le malade mourut la dixième heure de son entrée à l'hôpital. La rigidité de la verge avait cessé quatre heures avant la mort.

La première idée qui s'était présentée à nous, à l'aspect de l'érection insolite dont le malade avait été atteint, fut de présumer qu'il avait fait usage de quelque préparation de cantharides, qui, comme chacun sait, produisent ordinairement une irritation considérable sur les parties génitales. Cette opinion nous pré-

occupait en faisant l'ouverture du cadavre, et elle nous paraissait d'autant plus probable que les parties génitales étaient encore extrêmement gonflées, rouges, et que le gland présentait des taches violettes comme gangréneuses. On fit, dans cette idée, quelques essais sur les liquides contenus dans l'estomac et les intestins, qui ne donnèrent aucun résultat satisfaisant. Nous procédâmes ensuite à l'ouverture du crâne, et l'encéphale étant mis à découvert, tous les élèves présens furent frappés, ainsi que moi, de l'irritation vive dont le cervelet avait spécialement été le siége. Les hémisphères du cerveau ne présentèrent aucune trace d'altération organique, les tubercules quadrijumeaux antérieurs étaient très légèrement phlogosés, les postérieurs l'étaient à un degré beaucoup plus considérable, la masse médullaire désignée sous le nom de *processus cerebelli ad testes* était d'un rouge vineux, les feuillets du cervelet qui la recouvrent, et qui par leur jonction forment le processus vermiculaire supérieur, avaient le même aspect, et présentaient trois ou quatre petits foyers semblables à ceux qui sont représentés figure trois, n°s. 2, 3, 4; dans le noyau des *processus cerebelli ad testes* se trouvait un foyer plus considérable dont l'étendue aurait pu contenir une balle de fusil d'un calibre ordinaire; les hémisphères du cervelet étaient très injectés, mais à un degré moindre que le processus vermiculaire supérieur; le noyau des hémisphères du cervelet et les faisceaux désignés sous le nom de cuisses du même organe conservaient les traces d'une assez grande irritation.

On se doute bien que cette altération organique ne nous frappa pas seulement à cause de son siége; l'opinion de Gall sur les rapports qui lient les organes génitaux au cervelet était trop répandue pour qu'elle ne vînt pas se présenter naturellement à l'esprit, et il nous parut que, dans ce cas, la rigidité de la verge et l'inflammation dont les parties génitales avaient été affectées pendant la courte durée de la maladie, était liée avec l'irritation dont le cervelet avait été le siége.

Toutefois un rapport pathologique si extraordinaire ne pouvait être établi d'après un seul fait ; avant d'admettre cette opinion il était nécessaire de voir si elle se vérifierait dans des cas analogues. Je consultai dans ce dessein les observations nombreuses que j'avais recueillies sur les apoplexies, et qui m'ont servi à composer le mémoire que j'ai cité plus haut. Dans le nombre il s'en trouva deux d'individus qui avaient présenté des inflammations cérébelleuses, et qui, pendant la durée de l'apoplexie, avaient eu des érections assez prononcées et des éjaculations abondantes. L'une d'elles m'avait été communiquée par mon confrére le docteur *Lafore*, alors interne de l'Hôtel-Dieu. Je ne possédais que ces trois cas lorsque je publiai mon premier travail sur les maladies organiques de l'encéphale, et leur singularité même fut la cause principale de la réserve que je mis alors à les faire connaître. De noveaux faits sont venus confirmer les premières données, et non-seulement nous pouvons regarder comme positive l'existence des apoplexies cérébelleuses, mais encore nous pouvons espérer pouvoir les distinguer, dans la plupart des cas, de celles qui affectent les autres parties de l'encéphale.

Deuxième observation.

Thomas Marie-Anne, journalier, âgé de 55 ans, d'un tempérament sanguin, fort, très adonné aux plaisirs vénériens, passa au cabaret une partie de la journée du 19 avril 1818. Dans la nuit, somnolence, pesanteur, agitations momentanées, perte de connaissance, le malade ne répondait pas aux questions qui lui étaient faites, érection une partie de la nuit.

Il entra à l'hôpital le 20 avril au matin, et offrit les symptômes suivans : Face rouge et tuméfiée, stupeur légère dont il était retiré quand on l'excitait, respiration courte, suspirieuse par intervalles, treize, quatorze inspirations par minute ; pouls plein, fort, fréquent, quatre-vingts pulsations par minute ; hémiplegie du

côté gauche du corps, principalement à la jambe ; agitation spasmodique du côté droit. (Saignée de la veine jugulaire droite, lavement purgatif, orge, arnica, pour boisson ; potion antispasmodique).

Retour à la connaissance après la saignée, le malade paraît surpris de se trouver à l'hôpital. Le soir, paroxisme très fort, face tres injectée, gonflée, chaleur considérable au cou, respiration lente, onze, douze inspirations par minute ; pouls dur, plus fréquent que le matin quatre-vingt-cinq, quatre-vingt-onze, quatre-vingt-quatorze pulsations par minute : somnolence profonde, insensibilité á tous les genres d'excitation, satyriasis très violent, tuméfaction et rougeur des bourses, immobilité du côté gauche, mouvement convulsif à droite ; éjaculation abondante à la fin du paroxisme. Saignée, sinapisme aux jambes ; même état après la saignée, râle pendant la nuit : le matin du 21, face violette, gonflée, lèvres et nez froids, respiration très rare, très courte, pouls petit, irregulier, très fréquent, distorsion de la bouche, tuméfaction et rougeur vive des parties génitales, éjaculation, abondante mort à neuf heures.

Ouverture de cadavre.

En enlevant la voûte du crâne, il s'écoula une certaine quantité d'un sang noir. Tous les sinus de la dure-mère, ainsi que le confluent du sinus, étaient remplis de caillots noirs ; les vaisseaux de la pie-mère étaient gonflés dans toute son étendue ; la substance du cerveau ne présentait rien de particulier, mais le cervelet était plus rouge que dans l'état naturel. Lorsqu'on eut incisé une partie de l'appendice vermiculaire supérieur, l'action de l'air lui donna promptement une couleur rouge vif, toute la substance blanche de cette partie avait changé de couleur, on eût dit qu'elle avait macéré dans le sang. Plongée dans l'eau, elle se décolora, mais ne revint jamais à sa coloration naturelle. Quelques parties du noyau des processus paraissaient corrodées, mais il n'y avait pas

de foyer distinct. Le processus était divisé d'avant en arrière; nous aperçûmes un sang noir, épais, renfermé dans le quatrième ventricule; ce liquide avait pénétré en avant dans la scissure de Sylvius; en arrière, dans le calamus scriptorius.

En plongeant le cervelet dans l'eau, nous observâmes que ce sang provenait d'un foyer situé dans la partie centrale de l'hemisphère droit du cervelet; sa largeur était transversalement de deux centimètres et un millimètre; et d'avant en arrière, d'un centimètre trois millimètres; de haut en bas, il pouvait avoir un centimètre trois ou quatre millimètres; ses bords étaient frangés inégaux, surtout au côté externe; il occupait le centre de la masse grise qui se rencontre au milieu de l'hémisphère du cervelet; toute la substance blanche était injectée d'autant qu'on se rapprochait davantage des parois du foyer; la coloration formait des espèces de zones concentriques au foyer: la protubérance annulaire vers la naissance de la cinquième paire était phlogosée, ainsi que l'éminence olivaire et le commencement de la moelle épinière; les poumons étaient gorgés de sang, ainsi que les cavités droites du cœur et les veines caves ascendante et descendante; ces organes ne présentaient d'ailleurs aucune altération organique: le canal intestinal n'offrit rien de particulier.

Observation troisième, rédigée par M. Mance, *ex-élève interne de deuxième classe à la Pitié, et prosecteur a l'amphithéâtre des hôpitaux.*

Bourgoin (Nicolas), âgé de 46 ans, fut apporté à l'hôpital le 17 mai 1818. On ne put avoir aucun renseignement sur son état antécédent; à la vérité il nous présenta tous les symptômes des apoplexies cérébrales violentes. La respiration surtout était profondément altérée, et offrait en outre de particulier des mouvemens spasmodiques généraux, presque convulsifs, et

par intervalles. Un symptôme sur lequel M. Serres fixa notre attention, c'est que la somnolence persistait pendant la durée de ces mouvemens. (Saignée au bras, vingt sangsues aux jugulaires ; à midi, lavement purgatif, limonade végétale, potion antispasmodique.) Rémission considérable des symptômes après les sangsues.

Le soir à sept heures, paroxisme très violent, respiration très courte, inégale, rare ; pouls fort, dur, très fréquent ; érection, tension et gonflement des parties génitales, éjaculation de sperme abondante pendant la nuit, et, à ce qu'il paraît, à la chute du paroxisme.

Le lendemain 18, les symptômes apoplectiques étaient plus intenses que le veille. Nous fîmes part à M. Serres du satyriasis que nous avions observé, et, sur ce symptôme, ce practicien nous dit qu'il était probable que le cervelet était le foyer principal de la maladie ; les mouvemens spasmodiques avaient cessé, il ne restait qu'un trismus léger des mâchoires ; la respiration était toujours courte, inégale ; le pouls vif, fréquent, intermittent, chaque sept ou huit pulsations. La somnolence était profonde, la pupille resserrée et peu mobile par le passage alternatif de l'obscurité à la lumière ; les membres étaient tendus, roides ; on éprouvait à les fléchir une grande résistance : l'insensibilité devint générale. Le satyriasis n'existait plus, quoique les parties génitales, le pénis et les bourses fussent très rouges, gonflés et d'une température fort élevée. (Sinapismes aux pieds, vingt sangsues aux jugulaires, potion antispasmodique.) Le soir, les mouvemens convulsifs reparurent, le satyriasis fut très violent, le râle survint à six heures, et le malade succomba à onze.

Ouverture. — L'ouverture du cadavre fut faite à la leçon d'anatomie. La tête était violette, principalement les oreilles ; la chaleur était conservée vingt-sept heures après la mort ; les membres étaient rigides et dans l'extension ; les parties génitales gonflées, quelques taches brunes se remarquaient sur les bourses.

M. Serres rappela à cette occasion un cas semblable qui s'était présenté à l'amphithéâtre quelque temps auparavant. Un cadavre apporté de l'hospice de Bicêtre nous avait frappés à la distribution des sujets, à cause du gonflement énorme du pénis. M. Serres l'ayant fait apporter à son cours, nous dit que d'après le rapport qu'il avait observé entre l'irritation des parties génitales et celle du cervelet, il était vraisemblable qu'on en rencontrerait des traces sur ce dernier organe. L'examen de l'encéphale avait confirmé ce pronostic, et avait été l'occasion d'une longue discussion entre M. Serres et M. Lallement, actuellement professeur à la Faculté de médecin de Montpellier. En rappelant cette circonstance, M. Serres nous fit observer que le cas présent offrait une occasion très importante de vérifier ce fait, d'autant plus que la connaissance de l'histoire de la maladie ne permettait pas de mettre en doute la coïncidence d'une affection aiguë de l'encéphale et d'une vive irritation des parties génitales. Le crâne ouvert, l'attention se porta aussitôt sur le cervelet, dont le volume était plus considérable qu'il ne l'est ordinairement. La pie-mère et l'arachnoïde enlevées, cet organe nous parut d'une rougeur trés vive; quelques gouttes de sang étaient épanchées entre les sillons de sa face supérieure. Incisé à quatre linges environ de sa profondeur, toute la substance médullaire était d'un rouge vif. On mit à découvert trois petits foyers creusés dans l'épaisseur même de l'organe. Le premier, situé en arrière, à quelques linges du processus vermiculaire supérieur, était inégal, avait son plus grand diamètre transversal, et renfermait de petits grumeaux de sang. Le second, plus antérieur, se rapprochait davantage de la linge médiane, et avait une étendue double du précédent; il était aussi inégal, plus étendu d'avant en arrière que transversalement, et était rempli par un caillot de sang. Le troisième était situé à la partie antérieure et supérieure du cervelet. En outre, toute la substance du processus vermiculaire supérieur offrait, par intervalles,

de petites déchirures, qu'on pouvait regarder comme le rudiment de plusieurs petits foyers; les tubercules quadrijumeaux, surtout les postérieurs, étaient phlogosés, ainsi que le gros faisceau désigné sous le nom de *processus cerebelli ad testes.*

Les poumons, ainsi que les cavités droites du cœur, étaient gorgés d'un sang noir et coagulé. M. le docteur Edwards et M. le docteur Lisfranc, furent présens à cette ouverture.

Observation recueillie par M. Dubois *élève interne de première classe à l'hôpital de la Pitié.*

Le nommé Gambar, âgé de 52 ans, profession d'écrivain public, fut apporté à l'hôpital de la Pitié le 5 mars 1819. Il y arriva avec une perte complète de connaissance et insensibilité de la peau. La face était très rouge et injectée. La mort ne se fit pas attendre.

La peau était froide aux extrémités, et couverte d'une sueur visqueuse; la déglutition était difficile, bruyante et laborieuse; le pouls fort, développé, plein; les yeux étaient rouges, injectés comme le reste de la face. Il y avait une résolution complète des membres soulevés, ils retombaient de leur propre poids; on prinçait la peau sans exciter de douleur: il y eut quelques déjections involontaires. Les membres du côté gauche opposés à la paralysie étaient contractés; l'avant-bras, fortement fléchi, ne s'étendait qu'avec peine; le côté gauche de la face était pris de contractions spasmodiques, semblables à celles que l'électricité détermine dans les membres d'un animal récemment mort. Le pénis était dans un état constant de turgescence, et, dans certains momens, dans une érection complète. On remarquait sur la surface du gland quelques taches violettes qui semblaient faire craindre la gangrène. Les infirmiers nous dirent que le malade était toujours resté couché sur le dos, la tête fortement renversée en arrière.

L'ouverture fut faite par M. Serres lui-même, à son cours d'anatomie. Il avait annoncé une lésion du cervelet à cause de l'affection des parties génitales. On a trouvé dans le cerveau un épanchement dans l'épaisseur du corps strié du côté gauche, ou hémisphère gauche. L'épanchement avait au moins trois pouces de longueur et un pounce de large. Le sang était nouvellement épanché et en caillot rougeâtré un peu foncé ; un sang plus liquide était à la surface ; la portion du cerveau qui formait les parois de la poche où le sang était contenu, était diffluente à cause de sa macération dans le sang : la portion au-dessous était injectée de sang. On vit au dessus et sur les côtés plusieurs taches jaunâtres, dures, véritables cicatrices du cerveau. Celui-ci du reste était très injecté. Le cervelet, et surtout le *processus vermicularis* supérieur, offraient de petits épanchemens nombreux de la grosseur d'un grain de chenevis ; mais en arrière de l'hémisphère droit du cervelet, on vit un caillot de sang de la grosseur d'une balle de fusil. Tout le reste présentait à-peu-près la même organisation que l'on rencontre dans les épanchemens du cerveau.

M. Serres déduisit cette conséquence : que le priapisme avait été produit par la lésion du cervelet, qui a un rapport connu avec les organes génitaux, comme l'établit en effet M. Gall ; et il pense que si ces lésions n'ont pas encore été observées, c'est faute d'attention de la part des médecins.

Suite des recherches sur les maladies organiques du cervelet, par M. Serres, *médecin de l'hôpital de la Pitié, etc.*

Le précédent article nous a fait connaître le rapport pathologique qui existe entre le cervelet et les organes génitaux chez l'homme. La connaissance de ce rapport nous a été fournie par l'examen des malades pendant la vie, et des altérations organiques après la mort.

Remonter des symptômes au siege des maladies, établir leurs rapports avec les altérations organiques que nous présente le cadavre, telle est la marche que me paraissent devoir suivre les véritables observateurs en médecine, pour élever cette science au degré de certitude qu'elle peut atteindre.

Chacun sait que les maladies de l'encéphale sont celles qui offrent le moins de probabilité pour la certitude du diagnostique; on a vu néan moins que non-seulement nous avons précisé pendant la vie le siége des apoplexies cérébelleuses, mais que l'ouverture des cadavres a répondu à notre attente, en justifiant notre prévision. Ne voulant exercer aucune influence sur l'esprit des praticiens, j'ai lassé éparler les élèves qui avaient recueilli les observations à ma clinique; je n'ai rien ajouté à leurs réflexions, je n'en ai rien retranché; je vais en agir de même à l'égard d'une observation nouvelle qui m'est communiquée par M. le docteur Falret, déjà connu dans la science par ses intéressantes recherches sur la mélancolie suicide.

Observation recueillie par le docteur Falret.

"Je viens de lire avec le plus grand intérêt votre premier mémoire sur les apoplexies cérébelleuses, inséré dans le journal de M. Magendie. J'ai beaucoup regretté de ne pas y trouver l'observation d'un apoplectique que j'ai eu occasion d'observer dans votre division, à l'hôpital de la Pitié.

"En 1820, dans un article sur l'Annuaire médico-chirurgical des hôpitaux, qui par des circonstances indépendantes de ma volonté, n'a pas été imprimé, je rendais hommage à la précision de votre diagnostique dans les maladies organiques de l'encéphale. Je rapportais à cette occasion l'entretien que nous eûmes dans une des salles de votre division, au sujet d'un apoplectique âgé d'environ cinquante ans, entré de la veille dans l'hôpital.

"Pourriez-vous déterminer, me dîtes-vous, le siége positif que doit occuper l'épanchement chez ce malade? Non, répondis-je; et il y aurait, ce me semble, de la témérité à prononcer d'une manière affirmative. Eh bien! reprîtes-vous, je suis ce médecin téméraire. Je pense que l'épanchement est dans le cervelet, j'en ai pour garant l'érection du pénis, symptôme qui en effet avait beaucoup fixé votre attention et la mienne. Cette preuve ne me parut pas d'abord sans réplique; mais comme vous annonçâtes en même temps que le malade n'avait pas plus de trente-six heures à vivre, malgré tous les secours de la médecine, j'attendis l'examen du cadavre avec impatience, et à mon grand étonnement, je vis votre diagnostique parfaitement justifié.

"Je ne rapporterai pas ici tous les symptômes apoplectiques que présentait ce malade; ils étaient les mêmes que ceux des apoplexies cérébrales, mais de plus le pénis était gonflé, tendu, rougue, en un mot dans l'état d'érection. Voici en abrégé ce que nous trouvâmes à l'ouverture du cadavre:

"Developpement considérable des parties génitales, taches brunes sur le gland et sur les bourses, membres rigides et dans l'extension. Les tégumens du crâne n'offrient rien de remarquable. Les sinus étaient gorgés de sang; trois onces environ de ce liquide s'écoulèrent à l'ouverture de la tête. Les vaisseaux de la pie-mère étaient gonflés; la substance grise du eerveau était rougeâtre, injectée; mais on ne reconnut dans cet organe aucune trace d'épanchement ancien ou récent. Il n'en fut pas de même pour le cervelet; indépendamment de l'injection de cet organe, nous remarquâmes dans la partie centrale du processus vermiculaire supérieur un large foyer s'étendant à droite et à gauche vers les hémisphères du cervelet; un caillot sanguin le remplissait. Les *processus cerebelli ad testes* étaient très rouges; le quatrième ventricule contenait du sang. Les poumons étaient gorgés de sang; les organes de l'abdomen n'offrirent rien de remarquable."

Quoique ces observations soient en quelque sorte la répétition les unes des autres, qu'elles contiennent toute la confirmation du même rapport entre l'irritation aiguë du cervelet et celle des parties génitales, j'en rapporterai encore quelques autres que j'ai recueillies moi-même, persuadé qu'on ne saurait trop accumuler les faits particuliers, quand il s'agit de constater l'existence d'une maladie inaperçue et aussi grave.

Apoplexie cérébelleuse.

Jean-Baptiste-François Girardin, âgé de quarante-deux ans, potier de terre, d'une constitution très robuste, ayant le cou très court, très large, la face très développée, grand mangeur et grand buveur, très adonné aux femmes, était habituellement sujet à un flux hémorroïdal qui s'était supprimé depuis quelques mois. Le mois de janvier 1819, ce malade avait contracté une blennorrhagie pendant le cours de laquelle il avait eu des érections vives qui avaient nécessité l'emploi des sangsues au périnée, et l'usage des bains de siége. Il était à peine guéri, qu'il revint à ses anciennes habitudes. Il avait passé la nuit du 18 au 19 janvier dans un mauvais lieu; et s'étant mis dans un accès de colère violent sur les représentations qui lui avaient été faites sur sa conduite, il avait disparu de chez lui dans la matinée dn 19. On l'apporta le soir sans connaissance, la face tuméfiée et rouge, ses habits couverts d'alimens et de vin qu'il avait régurgités. On essaya de faire vomir le malade par l'emploi de l'ipécacuanha, mais on n'y réussit point. On apporta le malade dans ma division, le 20 mars au matin. Après m'avoir fait le récit que je viens d'exposer, sa femme me prit en particulier, et me confia que pendant toute la nuit il avait été en érection, et qu'elle présumait qu'il avait contracté une nouvelle maladie vénérienne.

J'examinai aussitôt les parties génitales, et je trouvai en effet que le pénis était encore tuméfie, rouge. En

examinant la chemise qu'on venait de lui ôter, nous remarquâmes qu'il y avait eu dans la nuit une éjaculation abondante. Le malade était en outre dans la stupeur; la face était vineuse et gonflée; le cou était tuméfié; la main, appliquée sur la région occipitale, donnait la sensation d'une chaleure brûlante; la respiration était courte, lente; chaque deux ou trois minutes il y avait une inspiration très longue; le pouls était fort, plein, dur, et fréquent; l'œil était injecté, la pupille contractée, les membres supérieurs et inférieurs excités; le malade les retirait et paraissait avoir le sentiment de la douleur.

Je fis pratiquer une saignée copieuse à la veine jugulaire, j'employai les révulsifs sur les membres inférieurs, et je fis appliquer des compresses trempées dans de l'eau à la glace sur les parties génitales; je fis prendre intérieurement la limonade citronnée en grande quantité, et après la saignée, je fis appliquer vingt sangsues aux vaisseaux hémorroïdaux.

La respiration devint plus libre après la saignée et l'application des sangsues; le pouls se ralentit; il y avait neuf, dix et douze pulsations de moins par minute. Les parties génitales étaient néanmoins toujours gonflées, rouges, mais l'érection du pénis ne reparaissait pas. La stupeur était diminuée, le malade parut même avoir repris sa connaissance.

Le soir, un paroxisme violent s'étant manifesté, on fit demander le chirurgien de garde, qui observa l'érection du pénis, et crut remarquer que le malade y portait la main. Il appliqua sur le membre viril de la glace pilée; l'érection parut calmée pour quelque temps; mais dans la nuit elle survint avec une nouvelle intensité. La respiration devint trés difficile; le bruit que son ronflement occasionnait fatigua beaucoup les malades qui l'avoisinaient; il passa la nuit dans cet état.

Le 21 au matin érection avait cessé, la respiration était courte, le poumon semblait ne se dilater que partiellement; le pouls était vif, précipité; la face était

livide et froide; les extrémités étaient au-dessous de leur température ordinaire; l'œil était terne, la pupille dilatée et immobile quand on frictionnait le globe de l'œil et qu'on ouvrait et fermait alternativement les paupières. Le malade paraissait paralysé du côté droit, tout annonçait une mort prochaine; le malade succomba en effet cinq heures après la visite.

Ouverture du cadavre.

Les tegumens du crâne étant enlevés, nous remarquâmes que la protubérance occipitale externe portait une saillie très considérable; nous fûmes également frappés de la brièveté du cou et du volume des couches musculaires de cette partie. Le crâne ouvert, les sinus étaient gorgés de sang, notamment le *torcular Herophili.* Les vaisseaux de la pie-mére étaient très injectés sur le cerveau et le cervelet; le plexus choroïde renfermait quelques petits kistes aqueux, qu'on désigne sous le nom d'*hydatides.* Après avoir mis à nu le cervelet, nous aperçûmes la substance corrodée dans la partie antérieure du cervelet; sur les bords de cette déchirure, il y avait quelques grumeaux sanguins qui indiquaient la présence d'un foyer creusé dans cette partie; en effet, en portant le doigt dans cette déchirure, nous pénétrâmes dans une caverne étendu à droite, de quatre lignes environ, vers la partie moyenne de l'hémisphère du même côté; à gauche, le foyer peu profond s'était étendu plus avant dans le centre de l'hemisphère; intérieurement, le foyer avait été borné par le lobule tonsillaire qui servait de plancher au foyer; de cette manière, il n'avait pas pénétré dans l'intérieur du quatrième ventricule.

La substance blanche du cervelet était irritée et rouge tout au pourtour du foyer; il y avait même quelques traînées de capillaires remplis de sang, qui lui donnaient un aspect marbré.

Les poumons étaient gorgés de sang ainsi que les cavités droites du cœur; la veine cave ascendante, les

veines jugulaires internes et externes, et tous les sinus cérébraux, comme nous l'avons déjà remarqué, etaient pleins de sang.

L'estomac et le commencement des intestins grêles étaient phlogosès; quelques ganglions mésentériques étaient engorgés çà et là. La vessie était remplie d'urine. Les organes génitaux tuméfiés offraient quelques taches livides vers la partie moyenne du scrotum; le tissu lamineux des corps caverneux du canal de l'urètre et du gland était gorgé de sang.

Le cervelet avait un volume plus considérable que dans l'état normal; les artères vertébrales étaient d'un calibre plus grand que dans l'état ordinaire. Cette augmentation de calibre était partagée par toutes les artères cérébelleuses. On peut même présumer que l'accroissement relatif du cervelet provenait de cette dilation de son système artériel.

Apoplexie cérébelleuse sans érection du pénis.

Après des observations si précises, j'étais presque en droit de conclure que le symptôme pathognomonique des apoplexies cérébelleuses était l'érection du pénis pendant la durée de la maladie. Je me suis en effet adressé cette question: toute apoplexie cérébelleuse est-elle accompagnée d'érection insolite? On devait le déduire des faits qui précèdent; l'observation suivante va nous montrer une exception, dépendante peut-être du lieu qu'occupait le foyer dans la profondeur du cervelet.

Jean-Charles Montagnon, blanchisseur, âgé de cinquante ans, mélancolique depuis sa première jeunesse, avait été sujet, dès l'age de quarante ans, à des tournoiemens de tête très incommodes, pour lesquels on lui appliqua un cautère au bras gauche. Il contracta également l'habitude de se faire pratiquer une saignée chaque deux mois, pour remplacer un flux hémorroïdaire qu'il avait eu de trente à quarante ans. Ces précautions et un régime assez régulier le firent jouir

d'une santé assez bonne jusqu'au 12 août 1821. Ce jour il s'échauffa beaucoup dans une marche forcée et se coucha au soleil, où il dormit environ deux heures. En s'éveillant, il se sentit engourdi; la jambe droite lui parut si lourde, qu'il lui semblait, dit-il en rentrant à ses fils, qu'elle était de plomb. Il fut triste toute la soirée, mangea et but très peu, et se mit au lit, assiégé par les idées les plus sinistres.

Pendant la nuit, le malade s'étant levé pour satisfaire quelques besoins, fut pris d'un étourdissement violent, suivi de chute dans laquelle la partie antérieure de la tête heurta l'angle d'une commode qui avoisinait son lit. On le releva sans connaissance. Il était dans une stupeur et une insensibilité profondes. On lui fit avaler de l'eau de mélisse mêlée à une infusion de tilleul, qui provoquèrent un vomissement abondant de matières verdâtres.

Après avoir vomi, il se trouva plus accablé, dit qu'il était perdu, et retomba dans la stupeur dont le vomissement l'avait retiré momentanément. Le médecin qui fut appelé dans la matinée du 13, fit pratiquer une saignée du bras qui ne produisit aucun changement à son état. On se décida alors à le conduire dans un hôpital. Il entra à la Pitié le 13, à deux heures de l'aprés-midi.

L'élève de garde qui fut demandé le trouva dans l'état suivant: face très rouge, abattue; respiration trés lente; le malade avait été menacé de suffocation dans la voiture qui l'avait amené; pouls dur, fort et fréquent; intermittence chaque trois et quatre pulsations; paralysie du côté droit; mouvement léger dans le bras quand on l'excitait; immobilité et rigidité de la jambe; langue jaune; œil fixe, pupille resserrée et très sensible à l'action de la lumière. On appliqua des sinapismes aux cuisses, on administra l'eau de veau émétisée, qu'on fit avaler difficilement, à cause de la contraction des muscles des mâchoires. Potion antispasmodique.

Je vis le malade dans la soirée, il était agonisant,

pâle, les lèvres violettes, la face tout-à-fait décomposée, la respiration vive, entrecoupée; on n'avait pu lui faire avaler sa potion. Il mourut dans la nuit, après avoir eu quelques mouvemens convulsifs des muscles de la face.

Ouverture du cadavre.

Sur le rapport qui m'avait été fait par l'élève de garde qui avait vu le malade, je crus qu'il avait succombé à une apoplexie cérébrale, et que nous allions rencontrer le foyer apoplectique dans l'hémisphère gauche du cerveau, la paralysie ayant été du côté droit. Je portai en conséquence toute mon attention sur cette partie de l'encéphale; mais l'ayant trouvée intacte, je continuai mes recherches avec tout l'intérêt que pouvait inspirer une paralysie bien constatée coïncidant avec une intégrité parfaite des hémisphères cérébraux. Je fis enlever avec soin le cervelet, quoique je n'eusse aucun soupçon que cet organe pouvait avoir été le siége de la maladie; mais en le renversant et le retirant du crâne, le doigt de l'élève interne qui faisait l'ouverture pénétra dans une caverne située à la base de l'hémisphère gauche de cet organe. Ce foyer contenait environ demi-once de sang; les bords en étaient inégaux, mais le cervelet n'avait pas été déchiré en totalité, car il n'y avait pas de sang épanché dans les cavités occipitales du crâne. Il s'étendait un peu en dehors et en arrière, vers le lobule mince de *Malacarne*. Intérieurement il ne s'était pas étendu dans le quatrième ventricule, quoique son extrémité se dirigeât vers la partie externe du corps rhomboïdal (corps strié du cervelet.) La matière qui l'environnait était phlogosée à une ou deux lignes d'étendue seulement. Du reste, la substance cérébelleuse n'était pas enflammée, quoique les vaisseaux de la pie-mère fussent plus distendus que dans l'état ordinaire.

Les poumons et les cavités droites du cœur étaient gorgés de sang noir, épais et coagulé.

Quoique cette observation ne coïncide pas avec les précédentes, elle mérite la plus grande attention : je fis prendre des renseignemens auprès des parens, pour savoir si l'erection s'était manifestée lors de l'invasion. La réponse fut négative. On ajouta même que le malade avait toujours mené une vie régulière. Pendant son séjour à l'hôpital, on n'avait aperçu aucun signe de gonflement ou d'érection du pénis. Il est alors à présumer que ce symptôme ne s'était pas manifesté chez ce malade. Reste à savoir maintenant si l'absence de l'érection tient au siége différent qu'occupait le foyer dans le cervelet. Je le pense, mais ce n'est qu'après de nouvelles observations qu'on pourra le conclure avec certitude. Pour le moment, nous devons nous borner à appeler sur ce point l'attention des praticiens.

Apoplexie cérébelleuse ayant son siége dans le lobule tonsillaire.

Parmi le grand nombre de cerveaux de l'homme que j'ai anatomisés pour mon grand ouvrage sur l'anatomie comparative de l'encéphale, on a rencontré un très grand nombre de lésions organiques anciennes ou récentes : l'une d'elles était située dans le lobule tonsillaire du cervelet ; le cadavre avait été apporté de l'hospice Saint-Antoine à l'amphithéâtre des hôpitaux, et était fort vigoureux ; je n'ai pu avoir aucun renseignement sur sa maladie ; je le regrette d'autant plus que j'ai constaté que l'homme seul possède ce lobule ; que chez les singes, les phoques et les cétacés, dont l'encéphale se rapproche le plus de l'homme, on ne rencontre dans leur cervelet aucune partie qui lui ressemble. Sur ce cadavre, ce lobule avait été détruit presque en totalité par le foyer, et le sang s'était épanché dans le quatrième ventricule. Les parties génitales étaient trés développées, mais sans gonflement pathologique.

Apoplexie cérébelleuse chez la femme.

Il est inutile de dire que le symptôme tiré de l'érection du pénis n'est applicable qu'à l'homme. La femme étant exposée comme lui à cette cruelle maladie, on doit donc chercher à la reconnaître sur d'autres indices; peut-être en trouvera-t-on dans le clitoricisme, dans la tendance à la nymphomanie. Une seule de mes observations peut mettre sur la voie à ce sujet.

Cérébellite chronique.

Marie-Jeanne-Joséphine Dubourg, âgée de trente-trois ans, couturière, fut livrée de bonne heure aux excès vénériens. Elle ne fut réglée qu'à vingt ans, quoiqu'elle se fût livrée dans une maison de débauche à tous les excès du coït, et peut-être même à cause de ces cxcès. Jusqu'à trente ans, de son propre aveu, elle avait été fatiguée, mais jamais rassasiée des plaisirs vénériens, et malgré les efforts de ses parens pour la retirer de la vie scandaleuse qu'elle menait, elle y était, disait-elle, irrésistiblement entraînée. Cet état dura jusqu'à l'âge de vingt-neuf ans; à cette époque, la cohabitation de l'homme ne pouvant assouvir ses desirs, elle se livra avec fureur aux excès de la masturbation, et tomba dans un assoupissement habituel à la suite de ces excès, assoupissement qu'on attribua aux boissons spiritueuses dont elle abusait également.

Honteuse de cet état, elle se soumit à un traitement assez violent; on brûla le clitoris dans l'espérance de faire cesser ses fureurs érotiques, qu'on regarda comme la cause d'une phtisie pulmonaire qui inquiétait la malade. Elle sortit de l'Hôtel-Dieu sans avoir éprouvé le soulagement qu'elle attendait, et reprit ses anciennes habitudes.

Elle éprouva en outre des maux de tête trés intenses, et devint tout-à-fait imbécille à l'âge de trente-deux ans; elle mourut à la Pitié, où elle était entrée pour aller à l'hospice de la Salpétrière. Elle succomba à une phtisie pulmonaire.

A l'ouverture du cadavre nous rencontrâmes une induration de l'appendice vermiculaire supérieur et inférieur; en quelques endroits il existait de petites ulcérations qui auraient renfermé un pois à cautère ordinaire. Les bords étaient durs, jaunâtres, le fond était tapissé par une membrane épaisse; il y avait dans la petite cavité une sérosité jaunâtre; en outre, sur le devant de l'appendice vermiculaire supérieur, toute la partie du cervelet était ramollie, et d'un jaune blanc; la substance cérébelleuse était dégénérée au point où elle se trouve chez l'embryon humain du deuxième mois et du commencement du troisième. Tout au pourtour des appendices vermiculaires, le cervelet était phlogosé et plus dur que dans l'état ordinaire. Les artères cérébelleuses étaient plus développées qu'elles ne le sont ordinairement.

J'avais fait injecter le cadavre pour bien examiner ces dernières artères; je portai également mon attention sur celles du bassin, et nous trouvâmes toutes les divisions de l'artère hypogastrique accrues de volume; les utérines, les vaginales, les vésicales, les hémorroïdales, étaient prodigieusement dilatées. Existait-il un rapport entre ces développemens des artères du bassin et la nymphomanie? je le pense, et je fonde cette assertion sur l'inspection anatomique de ces mêmes artères chez les phtisiques. Chacun sait que les phtisiques sont enclins au coït et à la masturbation d'une manière désordonnée; sur environ soixante cadavres que j'ai examinés dans cette intention, j'ai constamment trouvé les divisions de l'artère hypogastrique très augmentées dans leur calibre. Que cette dilatation du système artériel soit effet ou cause, l'observation ne m'en paraît pas moins essentielle à constater. J'ai aussi remarqué le cervelet, mais je n'ai rientrouvé

de remarquable ni dans son volume ni dans son poids.

Cérébellite chronique, observée chez un singe.

Je dois à la bienveillance de MM. les professeurs du Jardin du Roi, l'advantage d'avoir pu examiner l'encéphale d'un grand nombre d'espèces de mammifères que je n'aurais pu me procurer par mes correspondances particulières. Sur un singe mort en novembre 1821, j'ai rencontré la partie médiane du processus vermiculaire supérieur, et la partie interne de l'hémisphère droit du même organe, ramollies, jaunes, dans une espèce de bouillie.

Ce singe (le papion) était mort d'une phtisie pulmonaire. Il n'avait point eu de paralysie, mais depuis plusieurs mois il était triste, taciturne et sans appétit.

Apoplexie cérébelleuse chez la femme ; observation communiquée par le D. FALRET.

Marie-Jeanne Renouville, âgée de cinquante-trois ans, d'un tempérament sanguin, d'une petite structure, née d'un père qui a succombé à une attaque d'apoplexie, avait toujours joui d'une bonne santé. Le 2 septembre 1817, Renouville fut trouvée morte dans son lit. Rien la veille n'avait pu faire pressentir sa prochaine. L'ouverture du cadavre fut faite vingt-quatre heures après la mort. On trouva dans le crâ un épanchement énorme de sang, qui paraissait av commencé dans le quatrième ventricule, et avait déchiré le cervelet, au point qu'il formait une cavité dont les parois n'avaient que trois lignes d'épaisseur, et qui était remplie par un caillot de sang du volume d'un œuf de poule. Le cœur était très volumineux, le ventricule gauche avait plus d'un pouce d'épaisseur ; il y avait quelques ossifications aux valvules artèriques.

Les autres viscères paraissaient dans un état sain."

Philosophical Observation.

Before closing these considerations, I wish to direct the attention of physicians to the different degrees of manifestation, of which the instinct of generation is susceptible. In infancy, and even in some persons who have acquired their full growth, we do not observe it at all; these individuals are absolutely indifferent to women. It commences its manifestation under the form of interest, taste, inclination; it soon assumes that of desire, passion, and it may terminate by degenerating into the most degraded lasciviousness, and into true erotic mania. All these different degrees then are only modifications of one and the same fundamental quality. This remark confirms what I have said in another place, on the gradations of the same propensity, and will be of the greatest use to us hereafter.

Some remarks on the Report, made to the Academy of Sciences on Experiments, relative to the Functions of the Nervous System, by Baron Cuvier, perpetual Secretary of the Academy.

M. Flourens has just made some mutilatory experiments on the nervous system, particularly on the brain and cerebellum. He believes, that he has proved by this means, that the cerebellum is the regulator of the movements of voluntary motion (*des mouvemens de translation*). As some may be tempted to conclude from this, that the cerebellum is not the organ of the instinct of generation, I have deemed it necessary to make a critical analysis of these experiments.

I have not seen the memoir of M. Flourens; I only am acquainted with the report of M. Cuvier; hence his report will serve as the basis of my reflections.

Baron Cuvier commences by correcting, in a proper

manner, the new language adopted by M. Flourens. I have observed with pleasure that he has endeavoured to avoid confusion in the terms *irritability* and *sensibility*, sensibility and the conductor of irritation, &c.

"To express then," says M. Cuvier, "in general language, the true questions that M. Flourens has proposed to himself, and which, perhaps, are not determined with sufficient clearness in the title of his memoir, we shall say that he has endeavoured to ascertain by experiment,

"1. From what points of the nervous system must artificial irritation set out in order to arrive at muscle.

"2. To what points of this system ought impression to be propagated, to produce sensation.

"3. From what points voluntary irritation descends; and, what parts of the system ought to remain untouched, in order to produce it regularly.

"We will add that, in this first part, he has only considered these questions so far as they relate to vertebrated animals and to their nervous system of animal life; that is to say, to the brain, the spinal marrow, and to the nerves which come out from them.

"In order to resolve these questions, the author commences with the nerves, and repeating, as it respects them, experiments already known, he establishes the two general effects of their irritation, to be such as we have just announced them; he shows in a very precise manner that, in order that contraction should take place, there must be a free and continuous connexion between the nerve and muscle; and that, for sensation, a free and continuous communication with the brain is necessary; and he concludes that neither contraction nor sensation belong to the nerve; that these two effects are distinct; that they can take place independently of each other, and that these propositions are true, at whatever place or whatever branch of the nerve, the communication is intercepted.

"Pursuing the same course for the spinal marrow, he arrives at similar results. When it is irritated in

any point, it causes contractions in all the muscles which derive their nerves from below this point, if the communications have remained free; if the communications are interrupted, no contractions take place. It is exactly the inverse of this as it regards the sensations; and as in the nerves the empire of the will requires the same freedom of communication as sensation, the muscles below the intercepted point no longer obey the will of the animal, and he no longer perceives them. Finally, if the spinal marrow is intercepted in two different points, and the space comprised between these two points is irritated, the muscles, which receive their nerves from this space only, experience contractions, but the animal no longer has any control over them, nor receives any sensation from them.

"We cannot report all the different combinations, with which M. Flourens has varied the experiments detailed in his memoir; it is sufficient to say, that they all tend to the results, which we have just mentioned.

"The author concludes from this, that sensation and contraction no more belong to the spinal marrow, than to the nerves; and this conclusion is true, as it regards all animals. It would be an important question to decide, if it is equally the case with animals who have been deprived of their brain, and which, in certain classes, appear very far from losing instantaneously all their animal functions; but it is a question to which we shall have occasion to revert, in the sequel of this report, even as it respects warm blooded animals.

"M. Flourens concludes further, from a part of his experiments, that it is in consequence of the communication established between all the nerves by means of the spinal marrow, that there is established what he calls the dispersion or generalization of irritations, or, in other terms, general sympathies; but he has not sufficiently developed this proposition, to enable us to appreciate the reasonings, on which he founds it."

These experiments and these results being known, I shall dispense with making any reflections.

Baron Cuvier continues:

"He comes finally to the brain, and it was in this central part of the system, that we were led to expect new information from experiments, better directed than those of former physiologists.

"In fact, although Haller and his school had made many attempts upon the brain, to learn its vital properties, and whatever there might be peculiar in the functions of the different parts of which this complicated organ is composed, it may be said that these attempts have not been attended with sufficiently careful results; because, on the one hand, neither the connexion of the parts of the brain, nor the directions and communications of their medullary fibres, were sufficiently known at this period; and, in the other, these different parts were not sufficiently isolated in the experiments. When, for instance, the brain was compressed, it was not well known, on what point of the interior the compression had most strongly acted; when an instrument was passed into the brain, the depth to which it extended, was not sufficiently examined, nor into what organ it had been introduced. M. Flourens objects, with some reason, to the experiments of Haller, Zinn, and Larrey; and he has endeavoured to avoid this difficulty by operating principally by means of ablation, that is to say, by removing, whenever it was possible, that particular part, the especial function of which he wished to know."

The reasons, that induce Baron Cuvier to object to the methods of Haller, Zinn, and Larrey, are very good. But, it is to be feared, that ablation is not by any means the best method of learning the special function of any particular part of the brain. Cuvier distinguishes very correctly, the vital properties of the brain from their particular functions. We shall see, hereafter, whether the function, that M. Flourens believes may be attributed to the cerebellum, is not rather a special

function, than a vital property common to the medulla spinalis and the medulla oblongata. We must first know the special functions; that is to say, those which constitute animal life, before we can obtain a knowledge of them by means of ablation. For, in this case, the animal can no longer manifest their psesence or absence. But up to the present time, these special functions have not been known. Let us suppose that M. Flourens wishes to determine, by the ablation of the cerebellum, whether this part is or is not the organ of the instinct of generation, how will he be enabled to make the animal live sufficiently long, to decide whether the animal retains or has lost this instinct? By the ablation of the hemispheres, vision and hearing are lost; will any one be correct in saying, that vision and hearing are special functions, or, all the special functions of the hemispheres? If we did not previously know that animals possessed memory, how shall we be enabled to determine that the same operation had destroyed it? How can we subject an animal, thus mutilated, to experiments on special functions of which we have no idea? And how can we remove from the brain a single organ? Does any one know the commencement, the termination, or the limits of an organ?

Finally, how can we remove a part without affecting those that are contiguous to it? How can we remove the cerebellum, especially in the mammalia, without injuring the *medulla oblongata* and all the parts with which it communicates, its commissure in the *pons Varolii*, intertwined with the nervous fasciculi of the *medulla oblongata*, the *tubercula quadrigemina*, &c. And as the effects of the lesion are transmitted, to what part shall we then attribute the symptoms, themselves? Neither should we ever forget, that one and the same part may have its general vital function, and its particular animal function beside. If it were true, that the lesion of the tubercles in birds, always causes convulsions, it is not the less true, that the tubercles

are destined for vision. So, also, the cerebellum may participate in the vital function of the *medulla spinalis* and *medulla oblongata*, and, at the same time, have a particular animal function. Cuvier admits, that the brain is not only necessary for vision, for hearing, and, to convert the irritations of other nerves into sensations, but also, that it is the seat of memory and judgment; which are here, general vital functions, and special, particular animal functions?

Thus, all these experiments, by mutilation or ablation, confirm what I have before said, that, at most, we can obtain but few results, almost always very doubtful, in relation to the phenomena of irritability and sensibility, the functions of certain viscera, and those of voluntary motion. But never shall we obtain the least knowledge of the special functions of the cerebellum or the integral parts of the brain.

But Cuvier continues:

"In order that the results that M. Flourens has obtained, may be better understood, we will call to mind, in a few words, the vitality and mutual relations of the parts in question.

"We now understand, and particularly by the late researches of MM. Gall and Spurzheim, that the *medulla spinalis* is a mass of medullary matter, white externally, grey internally, divided longitudinally above and below by furrows, two fasciculi of which communicate together by means of transverse medullary fibres; that it is bulbous at intervals, and that it gives out a pair of nerves from each bulb; that the *medulla oblongata* is the superior part of the spinal marrow contained in the cavity of the cranium, which also gives out many pairs of nerves; that the fibres of communication of its two fasciculi, there intertwine in such a manner, that those of the right ascend to the left, and reciprocally; that these fasciculi, after being dilated a first time in the mammalia, by a mixture of gray matter, and having formed the prominence known as the *pons Varolii*, separate and take the name of

crura cerebri, continuing to give out nerves; that they swell out again by a new mixture of gray matter, and form the masses commonly called *optic couches*, and a third time, to form those that we call *corpora striata;* that from the whole of the external border of these last protuberances, there arises a layer more or less thick, and folded externally according to the species of animal, entirely lined with gray matter which returns to cover them from above, forming what we call the hemispheres, and which, after being bent in their middle, unite with each other by one or more commissures or fasciculi of transverse fibres, of which the most considerable, which exists only in mammalia, takes the name of *corpus callosum.* We know, farther, that on the *crura* of the brain, behind the optic couches, there are one or two pairs of protuberances much smaller, known when there are two pairs, as in the mammalia, under the name of *tubercula quadrigemina*, and from the first of which the optic nerves appear to arise ; that the olfactory nerve is the only one that does not evidently take its origin in the marrow or pillars of the brain; finally, that the cerebellum, a single mass, white within and cineritious without like the hemispheres, but oftener much more divided into external folds, is placed cross-wise behind the *tubercula quadrigemina* and upon the *medulla oblongata*, with which it is connected by transverse fasciculi, which are called the *crura* of the *cerebellum*, and which are inserted into the sides of the *pons Varolii.*"

Those readers who wish to compare the report on our memoir, that was presented to the Institute in 1808, with these passages, will easily perceive the subjects in the anatomy of the brain, that were then called in question, or altogether denied, and which are now adopted. This change of opinion justifies our anatomical discoveries, and does honor to the reporter. I am fully persuaded, that when this celebrated naturalist shall have studied my physiological discoveries, his ideas will be in accordance with my own.

When Cuvier speaks of the *cerebellum* as a single mass, he can only mean the cerebellum of fishes, reptiles, and birds. In the mammalia, the part which in birds constitute all the cerebellum, only forms the middle or fundamental part, since on each side there exists a lobe more or less complicated, but always symmetrical with its other half. Consequently, the cerebellum of the mammiferous animals is, like the brain of the class of double organs.

"It was in these diversified and complicated masses that it was necessary to seek for the point of departure of irritation, and the place of arrival of sensation; it was of their respective coöperation in the acts of volition, that it was necessary to be assured, and it is this which M. Flourens has endeavoured to obtain.

"He has first examined, how far we can go back to produce efficacious irritations on the muscular system, and he has found a point where these irritations remain inert; taking then the brain at its opposite part, he has irritated it more and more deeply, so long as it did not act upon the muscles; and when action commenced, it was found to be in the same place where its action was arrested in ascending. This place is also the same where the sensation of excitations, transmitted to the nervous system, is arrested; above this, punctures and wounds excite no pain.

"Thus, M. Flourens has pricked the hemispheres without producing either contraction in the muscles, or an appearance of suffering in the animal. He has removed them by successive slices; he has done the same with the cerebellum. He has removed at the same time, the hemispheres and the cerebellum; the animal continued insensible to suffering; the *corpora striata* and the *opthalmic couches* were operated on and removed in a similar manner, without producing any different effects.

"There did not even ensue a contraction of the iris, and yet it was not paralyzed by the operation." Dr. Spurzheim and myself, seeing so much contradiction

and doubt, in the experiments cited by Duverney, Gautier, Kaw-Boerhaave, &c., came to the determination to make similar experiments, the results of which I have already announced, Vol. II., p. 83, and the Phrenology of Dr. Spurzheim, p. 8. If we remove the greater part of the two hemispheres of the brain, and the greater commissure, to the cavities, in hens or pigeons, these animals still manifest distinctly, that they see and hear; but they would not take the food that was put before them, yet if bread was forced into the throat, they swallowed it. Rabbits, mutilated in the same way, have run, seen, heard, and even voluntarily taken nourishment. A considerable lesion of the cerebellum itself, does not injure the functions of the senses and animal life any more than the destruction of the superior parts of the brain proper; but if these lesions penetrate to the two great apparatus of supply (*renforcement*), the corpora striata, or the optic couches, or still farther, to the great commissure of the cerebellum (*Pons-Varolii*), convulsions and death ensue.

We concluded, from these experiments, that the whole of the brain was not necessary for the functions of the senses; but they by no means determine whether a portion of the brain, and what part of this organ, is indispensable to enable the functions of the senses to take place, with the consciousness of the individual.

Here, then, are results entirely different from those obtained by M. Flourens. In truth, I cannot understand how the whole brain and cerebellum, with the optic couches and the corpora striata, can be removed without interfering with the medulla oblongata, &c., and thus exciting convulsions and death, without mentioning the consequences of an inevitable and profuse hemorrhage.

"But when he pricked the *tubercula quadrigemina* there was observed an incipient trembling and convulsions, and these increased in proportion as the injury extended further into the *medulla oblongata.* The

wound of these tubercules, as well as that of the optic nerve, produced strongly marked and prolonged contractions of the iris."

In reading this passage, I anticipated the conclusion that the lesion of these tubercles would not excite convulsions more constantly than the lesion of the hemispheres. For they are ganglions implanted in the superior extremity of the *medulla oblongata*, and not its continuation. MM. Fodera, Fossati, and myself, have injured and removed the anterior pair of tubercles, but with the precaution of leaving the subjacent *medulla oblongata* untouched; rabbits have not experienced the least convulsion. But, when the lesion is made farther forward, the animal is seized with strong and rapid convulsions.

These experiments agree in result with those of Larrey, printed in the third volume of the journal of foreign sciences. (*Savans étrangers.*)

"Neither the irritations of the brain, says this physician, nor those of the *corpus callosum* itself, produce convulsions; we can even injure it with impunity. The only one of all the parts of which the brain is composed, which has appeared uniformly and invariably to excite convulsions, is the *medulla oblongata.* It is this which produces them to the exclusion of all the other parts.

"They contradict those of Haller and Zinn, in all which concerns the cerebellum; but from what M. Flourens has seen and enabled us to see, it appears since that these physiologists have touched the medulla oblongata, without being aware of it.

"In his language, M. Flourens concludes that the medulla oblongata and the tubercles are irritable; which, in ours, means that they are conductors of irritation, like the spinal marrow and the nerves; but neither the brain nor the cerebellum have this property. The author also concludes, that these tubercles form the continuation and the superior termination of the spinal marrow and medulla oblongata; and this

conclusion is in conformity with their anatomical connexions and relations.

"Wounds of the brain and cerebellum are no more attended with pain than they are with convulsions; and, in common language, one would conclude from this, that they were insensible. But M. Flourens, on the contrary, concludes that they are the sensible parts of the nervous system; which simply means that the impressions, received from sensible objects, must affect these parts to enable the animal to experience a sensation.

"M. Flourens seems to have proved this proposition so far as the sensations of seeing and hearing are concerned; when the cerebral lobe of one side of an animal is removed, he no longer sees with the eye of the opposite side, although the iris of this eye preserves its mobility; when both lobes are removed, he becomes both blind and deaf."

M. Fodera has had the kindness to repeat these experiments with MM. Dannecy, Fossati, Londe, Georget, and myself. I will relate, what we have observed to take place in pigeons and rabbits.

The first two rabbits from which the central and superior parts of the cerebellum were removed, died in three or four minutes. The hemorrhage as well as the convulsive motions were considerable. The section was made from above downwards. On one the medulla oblongata was reached by the instrument, and tetanic convulsions ensued.

The same operation was performed on a third rabbit. He manifested an air of astonishment; rose on his hind legs, moving backward, drawing his head constantly in the same direction, jumping up on his hind legs twice to the height of more than a foot and a half. When his leg was pricked he quickly drew it back. By degrees all the centre and a portion of the hemispheres of the cerebellum were destroyed; the fatal symptoms multiplied as the destruction progressed.

The first pigeon, whose crebellum was destroyed,

like the preceding rabbit, drew his head backward strongly, sometimes advancing and sometimes receding.

The second pigeon, quite young, carried his head backward, and stepped forward and backward, even after the cerebral hemispheres were removed.

The third pigeon, after the same operation, appeared at first completely stupefied, with tetanic contraction and very strong convulsions.

The experiment was repeated on a fourth rabbit; the superior part of the ventricle was destroyed, with the exception of the optic couches and the *corpora striata;* complete stupor ensued for some time; the animal then moaned piteously, and ran forward with violence. The *corpus callosum* was then destroyed; the animal then became quiet; he ran forward when irritation was applied. The optic couches and the *corpora striata* were then destroyed; the animal supported himself on his feet, moving forward.

Here again are very different results from those of M. Flourens, and they will always vary, according to the irritability and age of the individual, and the kind of instrument with which the experiment is performed; that is, whether it is dull or sharp.

In general, it is hardly possible to perform precicely the same operation two or three times in succession, and always obtain the same results. Many other experimenters have slaughtered a vast number of pigeons, rabbits, dogs, &c., and there has always been the same inconsistency and the same uncertainty, in the appearance of the phenomena. Nothing is more common than convulsions, occurring as the immediate consequences of lesions of the cerebellum, in birds and mammalia. Here, in speaking of the tubercles, we can, with much more reason say, that their connexions and anatomical relations with the *medulla spinalis* and *oblongata*, explain these convulsions. These experiments, then, at least in many cases, in no way contradict the experiments of Haller, Zinn, &c.

But, we do not find, that he has proved this, as regards the other senses, equally well. First, he has not,

neither can he perform any experiment relating to the senses of smell and taste; then, as to touch, even his experiments do not appear to us conclusive. In truth, the animal thus mutilated, assumes a stupid air, and acts no longer from his own volition; but when he is struck or pricked, he assumes the appearance of an animal just awaking. In whatever position he is placed, he preserves his equilibrium; if he is put upon his back, he quickly turns himself; if he is pushed, he walks. If it is a frog, he hops when touched; if a bird, he flies when tossed in the air; when held, he struggles to escape; if water is poured into his mouth, he swallows it.

Without doubt it would be difficult to believe, that all these actions are brought about without being incited by any sensation; it is true, that they are not in consequence of an effort of reasoning. The animal escapes without an object; he frequently falls against the same obstacle; but that proves, at most, and these are the expressions of M. Flourens, that such an animal is in a state of sleep, or acts like a man asleep. But we are also very far from believing, that a man who sleeps, who moves himself in sleep, who knows how to take, in this state, a more comfortable position, is absolutely deprived of sensation; and that he has had no distinct perception of it, and that he has not preserved the memory of it, is not a proof that he has not had these. Thus, instead of saying, like the author, that the cerebral lobes are the sole organ of sensation, we ought to restrain ourselves to well-observed facts, and limit ourselves to saying that the lobes are the sole receptacles, where the sensations of sight and hearing can be realized and become perceptible to the animal. That, if we should wish to add still further to this power, we should say, that in these lobes, all the sensations assume a distinct form, and leave permanent traces and enduring recollections; that, in a word, they constitute the seat of memory, a faculty by means of which the animal is furnished with the materials of its judgments. This conclusion thus

reduced to its precise terms, will become the more reasonable; for, besides the probability which the structure of these lobes and their connexions with the rest of the system, give to it, comparative anatomy affords another confirmation, in the constant proportion of the volume of these lobes to the degree of intelligence of the animals."

As to the opinion of Cuvier, I request the reader to peruse again, what I have said in the second volume, where I have exposed the reasons which seem to prove that other nervous systems, entirely independent of the brain, can also produce spontaneous motions and sensations.

Baron Cuvier seems to admit, that the seat of memory is exclusively in the brain, and to explain the judgment by the materials furnished by the memory. Has he considered the different species of memory? Can he explain, by memory, the varied and opposite talents, instincts, propensities, so multiplied in the different species of animals? Is the power of judgment in proportion to the strength of memory? No; so long as physiologists shall continue to follow old systems of philosophy, all their researches relative to the functions of the cerebral parts, will continue without any definite object or practical result.

"After having studied the effects of ablation of the brain, properly so called, M. Flourens examines those which ensue from the extirpation of the tubercula quadrigemina; the removal of one of them, after a convulsive motion which soon ceases, produces, as a permanent result, blindness of the opposite eye and an involuntary rotatory motion of the head; that of both tubercles, brings on complete blindness, and the motion of the head is more violent and longer continued. Still the animal preserves all its faculties, and the iris continues to be contractile. The entire extirpation of the tubercle, or the section of the optic nerve alone, paralyzes the iris; hence M. Flourens concludes that the ablation of the tubercle is attended with the same

results as the section of the nerve would be; that this tubercle is only a conductor of vision, and that the cerebral lobe above, is the ultimate limit of sensation and the place where perception takes place.

"It only remains to be remarked, that, in extending too deeply this extirpation of the tubercles, the *medulla oblongata* becomes involved, and that violent and long continued convulsions then ensue."

M. Flourens was very near admitting, that the tubercles are not always irritable. When he says that the animal preserves all its faculties, of what faculties does he intend to speak?

"In the experiments of M. Flourens, what appears to us most curious and novel, relates to the functions of the cerebellum.

"During the ablation of the first slices, there only appeared a slight debility and want of harmony in the motions.

"As this slicing proceeded, an almost general agitation manifested itself; the animal, although he saw and heard, only performed certain rapid and irregular motions."

"The power of flying, walking, and standing upright was lost by degrees.

"When the cerebellum was cut off, this power of performing regular motions entirely disappeared.

"When the animal was placed upon his back, he made no attempts to turn himself; yet he saw the blow with which he was threatened, he heard cries, he sought to avoid danger, and made a thousand efforts to do it without succeeding; in a word he preserved his faculty of perception and his volition, but he had lost the power of rendering the muscles subservient to the will; hardly did he succeed in his attempts to stand upright by supporting himself on his wings and tail.

"By depriving him of his brain, he was put to sleep.

"On depriving him of his cerebellum, he appeared to be in a state of intoxication.

"It is surprising," says M. Flourens, "to see a pigeon,

in proportion as he loses his cerebellum, gradually lose the faculty of flying, then that of walking, then finally that of standing upright; this takes place by degrees. The animal at first loses the power of keeping his balance, then his feet are unable longer to sustain him. Finally, every fixed position becomes impossible for him; he makes incredible efforts to retain some fixed point, but does not succeed; and still, when exhausted with fatigue, he seemed to take some repose, his senses were so much on the alert, that the least gesture caused a recommencement of his contortions, without the appearance of the least convulsive motion, so long as the medulla oblongata and tubercles remained untouched.

"We do not recollect that any physiologist has published any thing, which resembled these singular phenomena. Experiments on the cerebellum of quadrupeds, and especially those that are full grown, are very difficult, on account of the extensive portions of bone that it is necessary to remove, as well as the great vessels that are opened. Besides, most experimenters operate from some previously conceived theory, and are a little too apt to see what they wish to see; and certainly no one had doubted that the cerebellum was, in some respect, the balance wheel, the regulator of voluntary motion in the animal. This discovery, if repeated experiments, with all proper precautions, establish its truth, will do the greatest honor to the young observer whose work we have just analyzed.

"In conclusion, the Academy is as well able to judge as ourselves, that, independently of the superfluous mutations of language and known facts, which the author was obliged to reproduce in order to give a finished appearance to his work, this memoir presents more precise details than any which we before possessed, of many old facts, and that it also contains others which are as new as precious for science."

The experiments of M. Flourens on the functions of

the cerebellum, are precisely those, which appear to me to present the greatest uncertainty, and are the least to be depended on; on this account I shall bestow more time on their examination than on the preceding subject.

It was said above, that M. Flourens removed the cerebellum by slices; that he removed it entirely, and that the animal remained incapable of suffering. Here it is said that, during the ablation of the first slices, some debility was apparent, and a want of harmony in the motions; when the middle slices were removed, an almost general agitation came on; the animal, though seeing and hearing, only performed rapid and irregular motions.

This want of harmony, this almost general agitation of rapid and irregular motions, why do they fear to call them convulsive motions? This is apparently feared, since then the results of M. Flourens would coincide with those obtained by so many other experimenters, and they would lose the merit of novelty.

Indeed, if the different cerebral parts existed in an insulated condition in the brain, without any connexion, if we could remove these without injuring their envelopes, without causing any hemorrhage, we might cherish some expectation of arriving to sure results by their entire ablation; but how can any one be so foolish as to attribute certain effects to the ablation alone of a part, which is so intimately connected, above, below, in its middle portion, with the *medulla spinalis* and *oblongata*, with the annular protuberance or pons Varolii, with the crura of the brain, with the tubercula quadrigemina; of a part, whose ablation or mutilation is impossible, without seriously affecting organs destined to the execution of spontaneous motions, and of the functions of many senses; of a part whose ablation is necessarily attended with a constantly increasing loss of blood? How can physiologists base their propositions on experiments so confounded, so complicated and varied in their nature and their effects; on experiments, which are either in

contradiction to those of other very expert experimenters, or which produce different phenomena every time they are performed, either on another animal, or by other physiologists?

Is it astonishing, that the animal successively loses the faculty of flying, standing upright, of performing regular motions, of raising himself up when he is gradually ceasing to live? But, you will tell me, the animal sees, hears, feels, he makes a thousand attempts to avoid danger; the power of volition still remains; consequently it is not to impending death that we ought to attribute this irregularity of motions. Go to the bed-side of the sick, and you will often see those who have not the strength to move their arms, to shut their eyes, to put out their tongue, and who see, hear, feel, and internally make a thousand vain efforts to manifest signs of life, without there existing sufficient reason to attribute these phenomena to the partial death of the cerebellum.

The pigeon, whose cerebellum we destroyed, still walked backwards and forwards. Does it not require regular exertions of the power of voluntary motion to walk backwards and forwards? And even in order that the pigeon should with difficulty support himself on his wings and tail, as happened in the experiments of M. Flourens, it requires regular motions.

Thus every thing serves to prove that the idea that the cerebellum is the balance wheel, the regulator of voluntary motion, is rather a singular idea than a true discovery.

"The integrity of the cerebral lobes," continues the report, "is necessary for the exercise of vision and hearing; when they are removed, volition is no longer manifested by spontaneous acts. Still, when the animal is directly excited, he performs regular motions by means of this faculty, as though he desired instantly to end his pain and uneasiness; but these motions do not enable him to effect his object; very probably because his memory, which has disappeared with the

lobes which were the seat of it, does not continue to furnish a base or elements for his judgment. These motions have no connexion with each other for the same reason, because the impression, which has caused them, neither leaves a recollection or a durable volition. The integrity of the cerebellum is necessary to the regularity of the motions of this faculty; whilst the brain remains, the animal will see, hear, and have very evident and energetic volitions; but if the cerebellum is removed, he will no longer be able to maintain the equilibrium necessary for his locomotion. As for the rest, the irritability continues a long time in the parts without either the brain or the cerebellum being necessary to it. Every irritation of a nerve calls it into action in the muscles to which it is rendered; every irritation of the spinal marrow excites it to action in the members situated below the irritated point. It is entirely at the top of the *medulla oblongata*, where the *tubercula quadrigemina* adhere to it, that this faculty of receiving and of propagating, on the one part an irritation, and on the other pain, ceases. It is at this place, at least, that sensations must arrive in order to be perceived; it is also from this point that the orders of the will must depart; thus, the continuity of the nervous organ from this place to its several parts, is necessary for the performance of spontaneous motions and for the perception of impressions, either internal or external.

"All these conclusions are not identical with those of the author, and, especially, they are not related in the same terms; but they are those which have appeared to result the most rigorously from the facts which have been so well established. They will, without doubt, be sufficient to enable you to judge of the importance of these facts, to induce you to declare that you are satisfied with the author, and to invite him to continue to communicate to you the remainder of a work so full of interest."

In our experiment on rabbits, M. Spurzheim removed a large part of the hemispheres, and these ani-

mals continued to see and hear, and already we had established as a fact, that the totality or integrity of the hemispheres was not necessary for the exercise of the functions of the senses.

Without tormenting the poor animals, we had already proved that a disease of one of the anterior tubercles produces either a disease or blindness of the opposite eye. See my large work, vol. I. p. 113.

Without these cruelties, Sœmmerring had already said: "We have seen an individual, in whom a wound penetrated to the *corpus callosum*, lose the use of the eye on the side opposite the wound, whenever the pus accumulated there, and this blindness disappeared the moment the pus was evacuated; hence the sensation of vision takes place in the brain." Passage quoted, vol. II. p. 70.

Finally the pretended results of the experiments of M. Flourens, but very rarely agree with the pathological facts observed in lesions of the cerebellum. I have related the history of Réné Bigot, in whom, in consequence of a sabre wound, the right lobe of the cerebellum was exposed through an opening of the dura-mater. The *slightest touch of this organ occasioned vertigos faintings, and convulsive motions*, without his manifesting the least sign of pain. The same individual lost the vision and hearing of the right side. In the *post mortem* examination, the right lobe of the cerebellum was found shrunken, and of a yellow color; the *medulla oblongata* and *spinalis* was of a dull white, of a firmer consistence than natural, and reduced to a quarter of their volume; the nerves emanating from these parts, appeared also in a state of atrophy. This analogous condition of the *medulla oblongata* and *spinalis*, with that of the cerebellum, proves that this last is immediately connected with these parts, and that the lesion of the one influences the other. How then can we insulate the cerebellum and attribute to it, that which equally belongs to the diseased conditions of the parts connected with it?

Blindness or the changes of vision, which so often supervene upon diseases or lesions of the cerebellum, are explained by the connexion and the proximity of the cerebellum with the tubercles; the same connexion explains also the vivacity of the countenance, the fire or the languor and dejection of the eyes, in concupiscence, or after the satisfaction of venereal desires.

The wounded man, Augustus François, experienced sharp pains in the occiput, heaviness and numbness in the lower limbs, and so great a weakness of sight and hearing, that he could hardly distinguish the largest objects or hear the most acute sounds.

Boyer, in his *Treatise on Surgical Diseases*, vol. v. p. 78., cites an observation of Lapeyronie, and another fact reported by Petit, of Namur, which seem to prove that the lesion of the cerebellum, whatever may be the cause producing it, gives to the body an extraordinary vivacity of sensation. In the observation of Lapeyronie, the patient was a man whose intelligence was not in the least affected, and whose physical sensibility was very active. On opening the head the cerebellum was found to be a mass of tubercles filled with pus. The observation of Petit is still more precise. A soldier received a musket shot wound; the ball had traversed the left part of the cerebellum and penetrated to the posterior lobe of the left hemisphere of the brain. During the forty-three hours that this soldier lived, his judgment was sometimes good; he answered at this time whatever was asked him, but generally he was delirious; he was constantly in agitation, turning in bed from one side to the other, with his arms and legs in constant motion. Sensation was so acute in the whole of his body, that, at the least touch, he drew back the part on which the fingers were placed, as if he had been cut or burnt. This is a new proof of the immediate influence of the cerebellum on the medulla oblongata and medulla spinalis, and all the nerves which derive their origin from these parts. In consequence of the phenomena of

this wound, Petit made experiments on living dogs, and although in most of these animals, the lesion of the cerebellum was accompanied with an augmentation of the sensibility in all the parts of the body, Petit, notwithstanding, avowed that these experiments only excited doubts, which furnishes a further proof how variable and uncertain in their effects, are those lesions which are made designedly, and that they ought to be extended and multiplied, when the injury of the cerebellum is so great, or has continued sufficiently long, to transmit its irritation to all the neighbouring parts with which it is connected, to the *medulla spinalis* and *oblongata*, the *tubercula quadrigemina*, the auditory nerves, the first great ganglion of reunion (the *pons Varolii*), the great nervous fasciculi, (*crura cerebri*), the second and third great ganglions of reunion (optic couches and *corpora striata*), and thence to all the nervous mass of the hemispheres.

So also the irritations of any parts whatever of the hemispheres, or of the whole hemispheres may be successively transmitted to the inferior parts with which they are continuous. There is not a physician or physiologist, who cannot call to mind a great number of facts in support of this assertion.

How frequently do the lesions or diseases of the brain and its coverings, contusions, concussions, compressions, extravasations, excrescences, cancers, hydatids, inflammations, suppurating cavities, the seats of which are apparently solely limited to the hemispheres, produce the most general and alarming symptoms, the loss of the external senses, of sensation and the faculty of motion, of severe pains, partial and general convulsions, &c.

Let any one now determine what degree of confidence the prudent physiologist may give to the pretended results, obtained by mutilations and violent ablations of the cerebral parts, especially when it is required to determine the special functions of an organ, so much irritated and so intimately connected with other organs.

With the exception of the influence, that the lesions of the cerebellum exercise on the medulla oblongata and medulla spinalis, there exists, neither in the state of health, nor in that of disease, any relation or proportion, between the cerebellum and the regularity of the motions of the faculty of locomotion. Animals deprived of the cerebellum still regularly exert this power. The cerebellum of fishes, reptiles, and birds, is less complex than that of the mammalia. Have these last more regular or active motions of this faculty than the former? What relation is there between the successive development of the cerebellum from the moment of birth up to the twentieth or thirtieth year, and the regularity of these motions? Are the movements of the man at twenty or thirty years of age, more regular than those of the boy or girl, from five to sixteen years? Has it ever been proved by experiment, that individuals with a large cerebellum, have more regular motions than those, with a small one? Do women, who generally have a smaller cerebellum than men, walk and dance with less regularity, art, or grace than men? Does mutilation, which has such a powerful influence on the condition of the cerebellum, produce a derangement of the regularity of these motions? What connexion does the influence of the lesions, or the diseases of the cerebellum, or the genital parts, have with the regularity of motion? What have the painful tensions and heats of the back of the neck, apoplexies of the cerebellum, so often associated with the sexual functions, in common with the regularity of these motions? By the hypothesis of M. Flourens, neither of these questions is resolved. On the contrary, they are all answered, if we admit the cerebellum as the organ of the propensity for sexual union.

Why should we admit any other organ for the *regularity* of voluntary motion, than the organs for this motion itself? Would it not be absurd to admit some organs for the vision and hearing, and others

for the regularity and irregularity of these two functions? For the same reason it is sufficient to explain the irregularity of the motions of this faculty, to say that the organs of voluntary motion, the medulla spinalis and oblongata, may be irritated, injured, troubled, &c.

In order to admit, that the cerebellum regulates the motions of this faculty, it is necessary that a certain proportion should exist between the cerebellum, and the power, the quickness, and the regularily of these motions. Comparative anatomy does not support this idea. But this proportion between the medulla oblongata and medulla spinalis, and the nerves that are derived from them, exists throughout. The power, the agility, and the regularity of the motions of the tiger, the hare, the alligator, the boa, &c., are in proportion to the size of their organs, and not to that of their cerebellum, which in them is much smaller than in man.

We will further add, that the phenomena excited by these lesions, vary at different ages in different individuals; and they never justify any application from the fish to the reptile, the reptile to the bird, the bird to the mammiferous animal, or this last to man; that consequently these lesions can never supply sure and useful facts, either for physiology or human pathology; and that, finally, all these cruel mutilations have no other merit than that of vain curiosity.

II. *Love of Offspring.*

Nature, by another organ, secures the existence and prosperity of beings, procreated in consequence of the instinct of propagation. In all animated nature, there is manifested an imperious propensity to preserve and cherish offspring; we admire it in the insect, and it commands our veneration even in the tigress.

How happens it, that, to this day, neither philosophers nor physiologists have made any serious re-

searches in relation to this propensity? No one has endeavoured to discover the origin of this preserving instinct; no one has examined why this propensity differs in its manifestation, in different species, in the two sexes, and in different individuals. Does it result from the organization taken collectively, or does it depend on an isolated part? These are questions, which no one, before myself has examined. Ought it then to be a matter of astonishment, if, when I teach that this instinct is innate in man and other animals, that it is a fundamental and peculiar quality, and that it has its seat in a particular cerebral part, the idea should be deemed ridiculous, and at variance with common sense?

But, I will lead my readers by the same route, that nature has conducted me; in this way they will themselves discover this truth, which heretofore has seemed to them devoid of probability.

History of the Discovery of the Love of Offspring, as a Fundamental Quality, and of its Organ.

On comparing with indefatigable perseverance various forms of heads, I have observed that, in most of the heads of females, the superior part of the occipital bone recedes more, than in the heads or crania of men. Let any one compare the crania of men (Pl. XXX. XXXIX.) with the cranium of a woman (Pl. LVI.). As this prominence of the superior part of the occipital bone is evidently produced by the brain, it follows that the subjacent cerebral part is, in most instances, more developed in woman than in man. What was then more natural than the idea, that this cerebral part might be the material cause of a faculty or quality, manifesting itself in a greater degree in woman than in man?

But what is this quality, or this faculty?

There is not the least shadow of evidence, that the

love of offspring has ever been considered as a primitive power, a fundamental propensity; still less, as being produced in the organization, by a particular organ; and least of all, that any one should have believed, he could find this organ in the brain. For many years I have had different opinions, which I have successively discarded, on the difference in the form of the head in man and woman. In the conferences that I have held with my auditors, I have often spoken of my embarrassment on this subject. I observed finally, that the crania of monkeys, as far as this prominence is concerned, have a singular analogy with the crania of women. I concluded from this, that the cerebral part, situated immediately under this prominence, was very probably the organ of a quality or faculty, that women and monkeys equally possess in a high degree. I pursued with the more ardor this idea, because, from the organs I had already discovered, I was sure, that this region was not the seat of any superior intellectual faculty whatever. I more than once reflected, in my own mind, on the qualities and faculties that I knew were possessed by monkeys; finally, in a favorable disposition of mind, during the delivery of my lecture, I was struck with the extreme love that these animals have for their offspring. Impatient of comparing instantaneously the crania of male animals, in my collection, with all those of females, I requested my class to leave me, and I found, in truth, that the same difference exists between the male and female of all animals, as existed between man and woman. This new idea appeared to me as much the more plausible, as the organ of this instinct is found placed very near that of the instinct of propagation. What could be more in conformity with the order of nature?

Before presenting the proofs in favor of the existence of the organ of the love of offspring, I shall give an abstract of the history of this instinct, both in animals and in man. This sketch will be sufficient to

convince my readers, that it should be considered as a true fundamental instinct, as a particular primitive quality.

Natural History of the Love of Offspring.

Most insects, fishes, and amphibious animals, seeking to preserve their eggs from accidents from without, lay them in a place which facilitates the egress of the young, and where they are enabled to find food. Their solicitude for their young extends no farther.

In some of the species of these animals, the care that they take of their offspring even goes beyond this. Certain species of spiders carry their eggs in a little sack on their back, which they never part with except in the most pressing emergency, and which they immediately resume when the danger is passed. All those, who have once in their lives destroyed an ant hillock, must have seen, with what earnestness the ants collect their eggs and larvæ, to replace them in a place of safety. Wasps and bees, that at all other times permit us to observe them without manifesting anger, become dangerous to those who approach them in the season of their young. Who does not know with what indefatigable activity they nourish them, and with what courage they defend their young bees, with what anxiety they lick and caress them from the moment when they come out of the cells? We find also in birds, this tender affection for their young. The more they are taught, by sad experience, the dangers that threaten their young, the greater pains do they take in building secure nests, and in concealing and protecting them. After having with perseverance covered the eggs and hatched out the progeny, the parents nourish them with extreme tenderness; their watchful love foresees all the accidents which may happen to them, instantaneously gives them notice, and induces them to remain still and conceal them-

selves, or conducts them to a safe place. When the parents perceive that their brood is threatened, what anxiety, what alarms do they manifest! what stratagems do they put in operation to deceive the bird of prey, the serpent, the weasel, or man! and when we succeed in robbing them of their offspring, what painful cries, what stubborn resistance! Sometimes uttering plaintive accents, they follow the robber for considerable distances, to the very place where he deposits them, which they do not quit until they have lost all hope of recovering them; even hunger cannot oblige them to quit them in the moment of peril; often, even after long continued cold and humid seasons, we find the males and females dead, covering their young, victims also of the cold.

In the mammalia, also, the love of offspring is the most active and imperious of all the instincts. The mother observes with solicitude and anxiety every thing, which may become dangerous to her offspring. When the fox, the cat, the squirrel have the least indication that their habitation is discovered, they instantly abandon it, and conceal their young in another retreat. Animals of prey, however wild they previously had been, and with whatever caution they have concealed themselves in the vicinity, become rash when they have young to provide for; no danger stops them; they enter the gardens without caution, the poultry yard, the dove cot, &c. When all the outlets of a borough are furnished with snares, the foxes, when they have no young, keep shut up for fifteen days, until there only remains the alternative of dying of hunger or falling into the trap. But when they have offspring, the cruel hunter knows too well that the mother will not long resist their groans, and the father also, after having exhausted all the means of safety, will soon become the victim of his tender love for his progeny. Cats nurse the young of which the mother is sick or dead. With what earnestness does the bitch implore the pity of her master, who takes

from her one of her young? The hind and the female roebuck forget that they are unarmed, and rashly precipitate themselves on the enemy, when they are compelled to save or defend their fawns. With what fury does the wild sow defend her young! How formidable do animals of prey become, when they seek food to appease the hunger of their offspring!

Finally, who is there that forgets this admirable propensity in the human species? From the most tender age, nature begins to teach the woman the part of the mother, and makes her pass through the different degrees of instruction to prepare her for her future destiny. Observe this little girl, so seriously occupied in playing with her doll. She dresses it, undresses it, decks it in fine clothes, feeds it, gives it drink, prepares its night linen, puts it to bed, takes it up often, caresses it, gives it its lesson, scolds it, threatens it, and tells it stories. In this way she spends the whole day, weeks, and even months with her dear doll. It is with hearty good will also, that she assumes the care of her younger brothers and sisters. She feels, more acutely than they, their pleasures and their sorrows. Hardly does a new desire arise in her heart; nothing in the world has greater value or more charms in her eyes, than babies. Where is the father, or the mother, who does not call to mind with rapture the time, when, being single, they hoped soon to be married? And when the early indications attest that the union has not been sterile, what joy! what mutual felicitations! what plans for the future! Some young women experience especially an inexpressible delight, when they first perceive the movements of the living infant within them. The young wife becomes the object of the busy cares of the whole family; all await the decisive moment with impatience, mingled with anxiety! Is there any happiness purer than that which is depicted in the looks of a mother, watching with tenderness the wants of the infant, that she presses to her bosom? What duty is there more respectable and more sacred than

the cares, which parents take of the precious pledge of their love? If I had a city, there should arise in its centre an emblem of domestic happiness; a mother nursing her infant. Every time that a grandmother sees her grandchildren, or, her great-grandchildren, the sentiment of maternity comes again to her heart, and this benevolent instinct acts still, when all the other propensities are almost entirely extinguished within her.

Every sacrifice, the least action performed for the safety of a child, or, to administer to its happiness, deeply affects us; all, which discloses the heart of a barbarous mother, fills us with indignation and horror; every injury, inflicted on feeble infancy, or on a pregnant woman, or, a nursing mother, revolts us.

The interest, which infancy commands, influences even the judges in favor of criminals. Galba Sergius, though accused of the assassination of thirty thousand Lusitanians, and on the point of being banished, was absolved by the people, who were moved to pity, because, shedding tears, he pressed to his bosom two children of tender age.

Reflecting on all the circumstances that characterize the love of offspring, it is impossible to deny that it is an innate instinct, and intimately inherent in the organization.

In order to be convinced by the surest evidence, that the love of offspring is an innate and particular instinct, let us follow it in its different manifestations in the different species of animals, in the two sexes, and in different individuals.

In many species, the male, have little or no love for the young; such as the bull, horse, stag, wild boar, dog, cock, &c. In these species the love of offspring appears to belong exclusively to the females. It is very rare to see a dog bring food for his female companion with young.

In other species, on the contrary, the male and female equally love their young, and take care of them

in common. This particularly takes place in those where nature has established a marriage as durable as life; for example, in the fox, wolf, marten, pole-cat; in almost all birds, such as the stork, swan, swallow, blackbird, nightingale, (green finch,) sparrow, pigeon, &c. In these species, when the female dies, the male continues to cover the eggs and nourish the young. When both are alive, they generally cover the eggs alternately, and take care of the young in common.

Still, even in these species, it is observed that the female is more powerfully influenced by this instinct than the male. In cases of imminent danger the father escapes rather than the mother.

In each of these two classes again there exist differences between one individual and another. There are cows, mares, bitches, which submit with indifference to the loss of their young; some females even abandon them entirely as soon as they are born. Generally, pigeons, the male as well as the female, cover their eggs carelessly. They often let them get cold; frequently they crush them; sometimes they abandon their nest for the slightest cause; and when their young are taken from them, they do not manifest much sorrow. *Le Râle des Genets*, called the *king of quails*, sets with so much assiduity, that oftentimes the bird is beheaded by the sickle of the reaper. When the building in which there is a stork's nest takes fire, the parents precipitate themselves into the flames, rather than abandon their young.

The female of the silver rabbit and hamster neglect their young, and sometimes devour them, even when they do not want food. Nothing is more original than the idea of M. Virey, when he maintains that the females kill their young from maternal affection, when they have no milk. Let him but take the pains to compare the heads of such cruel mothers, among rabbits, sows, and women, with the heads of good mothers of the same species, and he will find the true cause. Other females are inconsolable for such a loss, grow

lean with sorrow, and utter lamentable cries. I have seen bitches seek their young for many months, with the most unwearied anxiety; they attack with fury all those whom they suspect of having taken them away, and overwhelm with plaintive caresses, those who they believe are able to restore them; when they find all their hopes disappointed, they fill the air with their continued howls. Some mares have such a passion for colts, that they lead away those of other mares, and take care of them with jealous tenderness.

In the different species, maternal love manifests itself still under different modifications. The female of the silver pheasant singularly loves her young; and on this account the nest and care of the young speckled hens are confided to her, in preference to the old hens. Some females have only an affection for their own young, and hate those of other females of the same species. The female partridge manifests the greatest tenderness for her own young, but destroys those of others. The hen pheasant (common) on the contrary, shows much less affection for her own young, and abandons, with apparent indifference, those that have wandered away; but she receives with joy and takes under her protection young pheasants, that are strangers to her.

Some animals live a long time with their young, and constitute a family; others quit them, as soon as they can do without assistance.

There are numerous families of insects, of amphibious animals, and of fishes, the males and females of which, do not trouble themselves about their young. Among birds, the cuckoo is entirely a stranger to the love of offspring. All her care for her posterity is confined to the preservation of her eggs, which she deposits in the nests of other birds, whose eggs she either eats or carries away. The masters of these nests, always smaller than the usurper, not only hatch out the eggs of the cuckoo, but still nourish,

with indefatigable complacency, the voracious young cuckoo. When any one takes him from the nest and places him in an aviary with other birds, or exposes him in a garden, all the birds around seem anxious to adopt him. I have frequently caused them to be raised by a wren; it was a pretty sight to see the adopted father mounting on the shoulders of the young cuckoo to introduce food into his mouth.

Man constitutes a part of that class, in which the male and the female love their young and take care of them with common accord. Notwithstanding this, the woman very much exceeds the man in this respect. This instinct is manifested in infancy; the little girl reaches out her hand for the doll, as the boy, for a drum or sword. When we wish to have a child taken care of, we call a servant girl and not a valet. Females who do not wish to marry, or those whose marriage is sterile, often adopt the children of others, in order to bestow upon them those cares which nature imposes on the mother. The whole physical constitution of woman combines with her moral and intellectual character, to prove to us that she is destined, more particularly than man, to take care of children.

These striking differences, in the manifestation of the love of offspring, strongly prove, that it is not a voluntary or factitious propensity, but an instinct resulting from organization, varying like it, but always natural and innate. Before entering into details relative to the cerebral part on which it depends, I shall advert to the opinions of some authors on the subject.

Opinions of Philosophers on the Causes of the Love of Offspring.

The manifestation of the love of offspring is a phenomenon of such daily observation, that, on this very account, no one takes notice of it. Whenever, in my youth, I inquired the cause of similar manifestations,

I was taken for a very singular man. It is natural, replied they to me, and my inquiry was terminated. But why is it natural? How has nature imprinted this instinct in animals? Has she not been obliged to appropriate a part in the organization, by means of which this instinct not only becomes natural in man and animals, but becomes also in them a want and a passion, which, at the same time that it procures for them great pleasures, provides for the preservation and the education of their feeble offspring?

Others would endeavour to satisfy me by speaking of *instinct*. In general, it is by *instinct*, as we have so often seen, that every thing in animals is pretended to be explained, as, in man, every thing has been accounted for, by will and intellect. But again, instincts also ought to derive their source from the organization. They are very different among themselves, sometimes even opposite to each other; they are developed at very different periods of life; such an instinct exists without another, &c.* All the instincts cannot, then, be collectively considered under the same denomination, nor be derived from the same source. Naturalists only follow natural deduction, when they endeavour to seek a particular cause for a particular effect.

"A mother," say they, "does not love her infant because she has a protuberance; she loves her child because it makes, or has made, her happiness; she loves it because it is a part of herself, because it is a part of the man who is or has been dear to her; she loves it because it resembles her, or at least she thinks so; she loves it because it is her work; she loves it from the pride she has in being a mother; she loves it from the dangers she has been exposed to on its account, from the pains it has caused her; she loves it because it is feeble and requires her aid; she loves

* See what I shall say in another volume in treating of instinct *ex professo*.

it because she has felt it within her, and because she has heard proceed from its lips the sweet sound of mother; she loves it, finally, from duty, from virtue, from habit, if you will, when there have not been other reasons sufficiently powerful." *

It certainly is not to such causes as these, that the Creator has confided the life and the well-being of children and the young of animals. He has provided better for their safety. Let any one examine the hearts of tender parents, and let him read there, whether their love for their children is determined by such artificial motives; if they can possibly do otherwise than love them? Do we not find examples of this tender love in the most degraded individuals, in the most savage nations, in a word, under circumstances where most of the motives above mentioned do not exist? Finally, in all these assertions, we entirely forget insects, amphibious animals, birds, the mammalia, terrestrial as well as aquatic, the natural history of which affords thousands of examples of this strong love of offspring. Let any one read the natural history of the ape, lion, sea-horse, or any domestic or wild animal whatever; every where he will find the most convincing proofs, that in the animal species, the love of offspring is an invariable propensity, essentially inherent in their nature.

It is true, that we may be sometimes tempted to doubt, whether, in the human race, the love of children is an inherent propensity. With what repugnance do not certain women observe the first development of the fruit of their womb! with what indifference do they not place in mercenary hands their new-born infant!

I have said, in another place, † that sometimes, both in animals and the human species, there are instances, where, from the want of development in its organ, this

* Journal of the Empire. The same objections have been made in the 21st volume of the Dictionary of Medical Sciences, page 210.

† Vol. I. § 5.

propensity is hardly manifested, and where this kind of insensibility is a natural condition.

Too often, I am aware, powerful reasons exist, which compel a woman to renounce the nursing of her child, and in such cases, I sincerely pity the mother. But much oftener the husband and the wife consent, from the slightest motives, to have their child nourished by a stranger's milk, at the risk of absorbing fatal miasmata, of which innumerable children become the victims, as well in the country as in cities. It is imagined, that the woman who fulfils her duty to her child loses certain charms; the cares of nursing, say they, are incompatible with the business of a wife who has a family to manage; but a much more powerful motive, as also more culpable, is, that the cares of nursing are incompatible with the pleasures of dissipation. It is difficult to conceive, why the writings of philanthropists have not made governments more scrutinizing in the matter of so great an abuse, in order that they might hold up to public contempt these unnatural mothers.

But if it is true that we can repress the instinct of propagation and the love of offspring, the most universal and imperious of all the propensities, it is a new proof against those, who pretend to infer the irresistibility of actions from the innateness of the propensities and the existence of their material organs. The love of offspring, say some, neither merits recompense nor admiration. Immediately after accouchement, the breasts and the nipples are distended with milk, so much so as to give the mother pain; nursing becomes a matter of necessity; the child or the young animals, by sucking, give ease to the mother; this is sufficient to cause the mother to love them. After the objection that M. Delfit has made to the instinct of propagation in the *Dictionary of Medical Sciences*, Vol. XXXVIII., page 267, he continues; "It is the same also, without doubt, with respect to the love of mothers for their offspring, considered as an instinct, or what is truly animal, and

making abstraction of all ideas or moral habits which may be connected with it. It is proved by constant observations, that this immediate affection belongs essentially to the dispositions of the womb, or the interior of the organ secreting the nourishing fluid; hence arises the necessity for nursing and the pleasure that attends it. How can we transport to another place, and to a particular cerebral division, the seat of a similar affection?"

How can any one be so ignorant in natural history, and especially in comparative physiology, so fruitful a means of enlightening the philosophical physician on the functions of our race? Where are those constant observations which prove that the love of offspring belongs essentially to a disposition of the womb, or the interior of the secreting organ of the nourishing fluid, &c.? As soon as the infant or the young animals have quitted their parent's womb, and a long while before the breasts are distended with milk, the mother warms, dries, and licks them with tenderness. If among them she finds one dead, she turns him every way with the expression of the most melancholy feeling, and often preserves him many days. What need of nursing have bees, ants, birds, and the males of those mammalia, where the two sexes divide the care of the young, as man, the fox, the marten? So much for the most constant observations!

"Maternal love," says Richerand, "surely is not the result of any intellectual combination, or cerebral action; it is in the *bowels* that it derives its source; it comes from them, and the greatest efforts of the imagination cannot produce it in those, who have not enjoyed the happiness of being mothers."*

No; it certainly is not the *result* of *any intellectual combination.* But Richerand also would deny that the *sentiments* are an operation of the brain. The whole natural history of woman, from infancy to decrepitude, refutes his gratuitous assertion. How

* New Elements of Physiology.

often, I repeat it, do we not see women, who have never desired or never been able to become mothers, adopt the children of others, and bestow upon them the most tender cares?

The love of offspring is active in animals, even before they have brought forth young. Birds, the mouse, the squirrel, and a hundred others, prepare beforehand a nest or lodging place.

If the love of offspring, say my adversaries, were the effect of an organ, it ought to be evident at all times; but we observe nothing of this in animals when they have no young.

But I have shown in many parts of this work, while speaking of other instincts or propensities, that the reason why they do not always manifest themselves, proves absolutely nothing against their innateness. The instinct of propagation, of travelling, of making provision for future want, of singing, are in a state of inactivity at certain periods of the year; and it is precisely the reason, that all these qualities can individually be active or at rest, that proves that they are independent powers, and that they each have a particular organ.

How happens it, notwithstanding this, that some women do not have an equal love for all their children, that it sometimes is the case, that they hate some of them? How is this possible, if the love of offspring results from the activity of an organ?

However serious this difficulty may appear to certain superficial minds, it is in fact of very little importance. First, I have often remarked that female dogs and cats love one of their young in preference to the rest. But, if similar preferences exist in the females of animals, they ought, by a much stronger reason, to take place in women, whom so many secondary motives can influence, such as the hatred or love they have for the father, the beauty or homeliness of the infant, &c. So, the stomach does not digest equally well all kinds of food, and all meats are not equally

agreeable to even the most voracious gourmand; all music does not please equally well every musical ear; every woman does not inspire every man with desires and love.

"These touching qualities of woman," says Cabanis, "necessarily depend on the kind of sensibility that we have said was peculiar to her. It is also to this cause, in a great measure, that we must refer the spontaneous development, or rather the burst of maternal love, the strongest of all the sentiments of nature, the most admirable of all the inspirations of instinct."

And in another place he says: "Of all the propensities that can be referred to the lessons of judgment and habit, is not maternal instinct the strongest and most predominant? To what power must we attribute these movements of a nature, sublime in its end and means, movements which are not less irresistible, but which are perhaps more so in animals than man? It evidently is not to the impression already received in the womb, or to the condition of the breasts, or to the sympathetic disposition in which the whole nervous system is found, in relation to these eminently sensible organs. Do we not constantly see maternal love as much more energetic and profound, as this sympathy is more internally active; provided, at the same time, that the abuse of or misplaced abstinence from amorous pleasures has not rendered its character unnatural? It is a fact, that, in general, cold women are rarely passionate mothers. The tenderness of fathers, in all species of animals, appears to be founded, at first, almost solely in the love they have for their companions. The influence of this sentiment, which is always imperious, often profound and delicate, causes them to partake with her a mother's interests and cares."*

After this, one would be authorized to regard the love of offspring as a result, or rather an extension of

* Relation of the Physical and Moral in Man, Vol. I, page 363.

the instinct of propagation. But I have already shown that the love of offspring is in full activity, without the least change having taken place, in the sexual parts. The instinct of propagation is extremely ardent in certain males, for instance, in the cock, dog, wild-boar, and stag, without these males taking the least interest in their young. In man, the instinct of propagation is generally more active than in woman; and notwithstanding this the females feel a stronger love for children. Many animals, for example, certain insects, amphibia, the cuckoo, among birds, take no care of their young, although they couple with great ardor. Others, such as bees and working ants, do not exercise at all the act of propagation, and notwithstanding this they take very assiduous care of the eggs and larvæ of the females. Who does not know women that are extremely voluptuous, who are very bad mothers?

The same woman of whom I have before spoken, who has never experienced any pleasure in the arms of her husband, and who is no more affected at the sight of a man than a woman, has given birth to twelve children, all of whom she tenderly loves. Do we not every day see women that despise the commerce of men, and bestow the most tender love on the children of strangers?

We are then compelled to admit, that the love of offspring is absolutely different from the instinct of propagation.

If a naturalist had only made a few of the observations that I have related, in speaking of the love of offspring, he could not have failed to suspect, that this instinct ought to depend on a particular organ. But it is very rare for a man to come to the discovery of any truth by reflection alone; it is requisite, in order to discover it, that reason should be guided by facts. For myself, I have not made all these observations, until after my researches on animals had convinced me of the existence of the organ of the love of

offspring, and that I had discovered its seat. I shall now complete the proof, that the instinct of the love of offspring is a fundamental quality.

The Love of Offspring and the Effects of its greater or less Development; continued.

In Man.

I have said, that, on comparing the different forms of craina, I had found that the superior part of the occiptal bone recedes much more in the heads of women than men, and I have referred the reader to Plates LVI. XXX. XXXIX.

I have shown in the first section of this volume (on the influence of the brain on the form of the cranium), that those only of the prominences of the osseous box, which are formed by the encephalic mass, have a signification in craniology.

Let the reader then compare the brains of the two sexes that I have caused to be engraved in my large work, and he will be convinced, that the difference of the form of the cranium in man and woman really depends on the difference in the form of their brain. These brains have not been designedly chosen; all have been absolutely taken by chance.

The plates V. VI. VIII. IX. XII. represent the brains of men; the plates; IV. X. XIII. those of women. We see distinctly that, in these last, the cerebral parts II. definite development, (*épanouissement,*) or that part of the organ of the love of offspring which is externally apparent, are much more developed, and encroach much more upon the cerebellum than in the first; now, it is from this greater development, that the prominence of the cranium results. This difference of form of cranium in the two sexes, is apparent from infancy. The cranium represented in plate XXXVI. is that of a boy twelve years of age; that represented plate XXXVIII., a girl six years old.

Sometimes these two parts of the posterior lobes separate considerably from each other; in such cases they produce a double prominence of the occipital bone, that is to say, there is then a double prominence on each side, and, between the two, there is a depression in the form of a groove. Most frequently these two lobes are contiguous, and the prominence of the cranium appears as a single protuberance.

I have already refuted, in the second volume, the opinion of those, who believe that these posterior lobes are the organs of the most eminent faculties in man, for the reason that these two lobes, according to some naturalists, are wanting in brutes. The fact is, that, in most animals, these lobes do not cover the cerebellum, which circumstance has induced superficial observers to maintain, that they are entirely wanting. But the reason, why these lobes cover the cerebellum or leave it exposed behind them, depends solely on the horizontal or vertical position of the animal, as I have already said. This place, that is assigned to the most eminent faculties, does not accord in any way with the gradual perfectibility of the brain and its functions. Let any one examine with attention the heads of individuals of both sexes of every age, and he will almost always find in them the same difference; most frequently it will be found that the diameter from the frontal to the occipital bone, in girls and women, is greater than in men, because, in the former, the occiput recedes more. The cerebral part, placed in the occipital bone, is greater in women than in men, although the whole brain of the woman is smaller than the entire brain of man.*

There are, however, exceptions to this rule. Sometimes the cerebral part situated in the occiput, is feebly developed in a woman, and has acquired a very great development in a man. In these cases we may with

* This form of head, peculiar to woman, should not escape artists; they ought to regard it in representing women.

much probability presume, that the woman resembles her father, and the man his mother, unless it is the case, that this particular conformation is hereditary in the family.

Men, with such a conformation, have a particular love for children; and when in them the organ of propagation is slightly developed, they console themselves with an apparently very philosophical resignation for the loss of a beloved wife, whilst the death of a child plunges them in profound and lasting grief. The sterility of their wife occasions despair in them, and often this circumstance is sufficient to induce them to treat with disregard a companion, who is very estimable in all other relations.

In those cases, on the contrary, where this organ is feebly developed in the woman, the consequence is, that she has hardly the character of her sex. Her principal destination is wanting. When, against her wish, she becomes a mother, her own children, if not odious, are at least indifferent to her. I knew, at Vienna, a lady who loved her husband tenderly, who managed the affairs of her household with intelligent activity, but who sent from home, immediately after their birth, all the nine children of which she was successively delivered, and for years she never desired to see them. She was herself astonished at this indifference, and could not account for it. In order to acquit her conscience, she required that her husband should daily see her children, and attend to their education.

The unfavorable development of the organ of love for offspring, is the principal cause of the slight affection, or even negligence, which certain women manifest in their conduct towards their own children, or those of strangers confided to their care. Hence these cruel mothers, like Isabella of Bavaria, of whom history relates, *that she had stifled all the sentiments that she owed her children.* Let us imagine a woman, in whom the organ of love of offspring is slightly

developed, without education, and having none of those motives which religion and morality afford, living a life of celibacy, a prey to an unfortunate love, having yielded to the desires of a lover who abandons her, and fearing contempt and misery. If a woman, thus situated, feels within her the fruit of her love, she will either destroy it before it comes into the world, or she will forsake it the moment it is born; if, unfortunately, the organ of murder is developed in her, can we be astonished if she destroys it with her own hand?

In twenty-nine women who had committed infanticide, that we have had occasion to examine, the organ of the love of offspring was very feebly developed in twenty-five. I refer the reader to what I have said on this afflicting subject in the fifth section of the first volume. There I observed that it is not solely the want of development in the organ in question, which determines mothers to infanticide, but that mothers thus defectively organized yield, sooner than others, to any unfortunate circumstances which incite them to crime, because they are not endowed with that profound sentiment which, in the heart of a good mother, would victoriously revolt at a similar attempt.

From the moment in which the young female, in whom this organ has acquired a very great development, knows her destination, all her ideas have the desire of being a mother for their basis. Every child that she meets gives a new impulse to the wishes that, perhaps without being aware of it, she forms in the bottom of her heart. However well and pleasantly she may be united in marriage, she cannot find happiness in her union if she is not a mother. An estimable husband is without doubt a precious treasure for such a woman, but nothing in her eyes approaches the happiness of having children. Let the nurse neglect, but for a few instants, to return with the beloved infant, and the alarmed imagination of the

tender mother depicts to her a thousand perils, which threaten it. In the moment of eminent danger, where is the hero whose courage equals that of a mother? How many women who lead a very wretched life with their husbands, still bless their marriage ties, for the sole reason that they have children!

We generally find the organ of the love of offspring more developed in certain nations than others. We observe that it is usually so in negresses; hence infanticide is a crime almost unheard of among these people. M. Peale, as well as other persons, from whom I have derived information on this subject, assure me that they have never heard of a similar crime committed by a black.

This organ is also generally very much developed in male negroes; thus we often see in Europe these people anxious to have the charge of children.

Travellers relate that the Tunguses and the inhabitants of North America, have an extraordinary love for children. I have seen at Gœttingen, at the house of M. Blumenbach, two crania of Tunguses, and one cranium of an inhabitant of North America; in all three this organ was very much developed. Thus not only individuals, but entire nations, furnish proofs that the cerebral parts, placed in the occipital region, are the organ of the love of offspring. Let us now see what takes place when the organ is excessively excited.

Alienation of the Love of Offspring.

We have seen that the over-excitation of the organ of the instinct of propagation produces a partial mania, — erotic mania; in a similar manner arise all the monomanias, diseases, the explanation of which becomes impossible, if we do not admit particular organs.

In the great hospital of Vienna, there was a pregnant woman who was attacked with a serious disease. I was told that she had a very peculiar kind of delirium, that is to say, that she believed herself pregnant with six children. In consequence of my principles, I attributed this phenomenon partly to a more than ordinary development, and partly to an over-excitement of the organ of the love of offspring, and I entreated the physicians to send me the head of this woman in case she died. She died. What was my joy in seeing an extraordinary development of this organ! the posterior lobes not only encroached upon the cerebellum much more than they usually do in women, but they were farther rounded and very voluminous. PLATE LX. represents this cranium.

M. Rudolphi would explain the posterior elongation of this head, by pressure, which it may have suffered from above downwards. But how could he prove that a similar pressure had in fact taken place? Why have not the bones equally yielded in the direction of their breadth? For the rest, when a cranium is deformed by pressure, the cerebral parts may really be a little displaced, but can never acquire by this a greater than ordinary development. Similar objections would be admissible, at most, in the case where a physiologist should undertake to determine the seat of an organ, from a single fact and without having any other proof in support of his assertions. But when every thing in nature concurs to establish the same assertion, a single fact, which comes by chance to its support, becomes a new proof.

At Paris, I professionally attended a very modest lady, that was attacked with a mental disease. She lived in very genteel society, and went to Vienna in company with respectable people. She had hardly arrived there, when she visited all her acquaintance, and told them with the most lively joy, that she was pregnant. The circumstance of this disclosure, and

the known character of the lady were sufficient to induce some of her friends to believe that she had become insane. Soon this immoderate joy gave place to violent anguish and an invincible and melancholy taciturnity. A short time after this, she was attacked with consumption to which she soon became a victim. Here, again, the organ of the love of offspring was extremely developed, and, during life, this lady had singularly loved children.

We saw also in the hospital for the insane, at Amsterdam, a lady who incessantly talked of her pretended pregnancy. Her head was small. The organ of the love of offspring was the only one, that was very much developed.

We have even seen, in another insane hospital, a man who maintained that he was pregnant with two infants. We declared that he must have the organ in question very strongly developed, and the examination of his head proved that we were not deceived. Thus, then, the state of disease proves further that the instinct of the love of offspring ought to be considered as a fundamental quality, independent of all others, and founded in a particular organ.

The following case reported by M. Pinel, proves with what energy this instinct continues to act in mania.

"It is so common for affectionate mothers," says this author, "to preserve still the profound sentiments of nature, in all the periods of their insanity, that we ought, with the greatest care, to spare them the sight of children that are strangers to them, and which some have occasionally the imprudence to bring with them in visiting some convalescent; this has sometimes excited the most stormy scenes. An insane woman while laboring under a violent paroxysm, saw a child which some stranger was leading by the hand; she believed it to be her own, and immediately sprung to seize it; she made the most violent efforts, and uttered frantic screams, while the real mother

was so affrighted, that she swooned, and continued in this state more than an hour. Another insane female who was convalescent, and who had the liberty of jumping, playing, prattling, and of practising a thousand innocent tricks, and of walking freely in the courts, escaping one day through the entrance gate, accidentally found a child at the porter's lodge, which she seized upon, and it was necessary to make use of strong efforts to get it from her. She immediately relapsed into furious mania, wounded many of the servant girls, and it was with great difficulty that they were enabled to confine her in her cell. The furious delirium, which was the consequence of this, was of many months' duration.*

"A mother, esteemed for her extreme attachment for her family, and whom domestic troubles had thrown into profound melancholy, regarded the food that was offered her as the portion that was destined for her children, and rejected it with indignation; it was necessary to submit her frequently to the shower-bath, to prevent her dying of consumption." †

Hildenbrand, in his work on contagious typhus, relates the case of a young Jewess of Galicia, who impatiently desired, while she was in the delirium of typhus fever, to have her son, who was distant ten miles, present with her. She caused him to be brought, received him with affection, and tenderly blessed him; after this, she took nothing but from his hands; and, when the delirium had subsided, she was astonished at his presence, asked him why he had come to her, and felt then, for the first time, with real knowledge, the true joy of a mother agreeably surprised.

* On Mental Alienation, 2d edit. p. 278. † Idem, 296.

Of the Seat and the External Appearance of the Organ of the Love of Offspring in Animals.

I have examined, as much as it has been possible for me, the crania of birds, from the smallest to the largest, and of mammalia, from the mouse to the elephant, and I have found throughout that, in females, the cerebral part, which corresponds to the organ of the love of offspring in the human race, is more developed than in males. Let any one present me, in water,* the fresh brains of any two adult animals whatever, the one male and the other female, and I will distinguish the two sexes without ever being deceived. In the male the cerebellum is larger, and the posterior lobes, smaller; in the female, on the contrary, the cerebellum is smaller and the posterior lobes, or the convolution belonging to this function, are larger, and especially longer. When these two organs are distinctly developed on the cranium, I am able also to distinguish the two sexes by the simple inspection of the osseous box. In those species, where the difference of the love of offspring is very great between the sexes, the crania differ, sometimes, so much in their form, that we find them in certain collections arranged as different species, or at least as varieties of the same species, although they are taken from individuals of the same variety, but of a different sex.

As the whole of this subject requires exact, and even minute, observations, I ought to make here, for the use of those of my readers, who attach more importance to facts than subtile reasoning, some remarks on the differences which take place in different species, as regards the situation of the brain as well as the form of the cranium. But still I repeat, that we ought always to bear in mind, that only those prominences of

* It is necessary to put the brains in water, because, without this precaution, they would become deformed by their own weight.

the cranium occasioned by the cerebral parts, have any relation with organology.

In most birds, the cerebellum is situated behind the hemispheres of the brain, and is entirely separated from it. (Pl. I. fig. II. 5, 7, 8.) In females, the hemispheres of the brain are more developed, larger, longer, and higher than in the males; and it is on this account, that the cranium of females is wider, longer, and more prominent in the corresponding region.

But this difference is not very striking, except in those species, in which the male takes very little care of the young. Plate LVII. the regions marked II. are, without exception, more prominent in the cranium of the female than in that of the male. The cranium of the female manifests, in its superior part, by the side of the median line, two oblong elevations, which extend to that part which encloses the organ of hearing. Compare the cranium of the hen, fig. 2, and that of the hen turkey, fig. 4, with that of the cock, fig. 1. and that of the turkey cock, fig. 5. It is very easy, in these species, to distinguish the sexes, either by the eye or touch.

It requires a much more practised eye to distinguish the sexes by the form of the cranium, in those species in which the male and the female equally take care of their young. But even in these, the posterior part of the head is more convex in females than in males; because the former have always more attachment for their young, than the latter.

The difference is particularly well marked in those females who love their young extremely, either on account of the nature of the species, as the female of the silver pheasant, or by virtue of a particular organization. There is not a single farmer's wife that does not know, that individual differences exist in this particular, and who cannot very well distinguish in her poultry yard, those of the female hens, turkeys, ducks, and geese, that cover their eggs and manage their young with assiduous care, from those which destroy

their nests, or neglect and abandon their young. Let any one compare the heads of those possessing these opposite qualities, and he will be struck with the great differences.

The amateur, who wishes to form a collection with this point in view, ought not only to know the natural history of each species, but he should know besides, the peculiarities of each individual.

In general, the naturalist, who wishes to devote himself to organological researches, ought not only to be instructed in the habits of each species of animals, but he ought to know the particular conformation of their brain and of their cranium. It is impossible for me to give this subject all the developments of which it is susceptible; I should fill a volume on each organ and each fundamental quality or faculty, and yet the most detailed descriptions could never be so instructive, as a collection formed by an attentive observer. I will add a few words more on the mammalia.

We should also commence our observations on the mammalia, in the largest species, and especially in those, where the male takes no care of the young.

Let any one compare the cranium of the stallion with that of the mare; when the horses are young, the superior posterior part of the head of the mare is considerably more prominent and larger than that of the stallion. In the mare, the two parietal bones are more prolonged backwards, because the cerebral parts placed under these bones are more prominent, larger, and longer than in the male. As the horse becomes old, a transverse bony crest is formed on the occipital bone, which makes a projection between the ears. This crest is not in fact hollow, but as the subjacent cerebral part, which touches it within, is more developed in the mare than in the stallion, and elevates itself or recedes more, (as the head has a vertical or horizontal position,) this crest is more elevated in the mare, so that we can distinguish the two sexes by the simple inspection of the cranium.

The same thing happens in the bull and cow. See Pl. LIX. II. II. fig. 2, the male calf; fig. 1, the female calf. In the bull, the superior part of the head forms nearly an arc of a circle conjointly with the horns; in the cow, on the contrary, the summit of the head is elevated much more above the horns.

In the stag and hind, the roe-buck, fig, 1, and its female, fig. 2, Pl. LXV. II. II. the male and female goat, the male and female chamois, the ram and the sheep, the male and female wild goat, and in all the varieties of this family, the same difference exists in the conformation of the head, in the two sexes, as well in youth as in advanced age.

In all other animals, whether the male interests himself or not, in the care of the young, the region of the cranium, II. II. always recedes more in the female, and is less salient and more obtuse in the male; for instance, in the entire races of cats and dogs. Pl. LVIII. fig. 3, is the female cat; fig. 4, the male cat; fig. 7, the female dog; fig. 6, the male dog. In the badger, marten, beaver, marmot, and all gnawers; in rats, Pl. LVIII., fig. 1, female rat; fig. 2, male rat; the difference is often more strongly marked than between the bull and cow; the same thing takes place in the mole, shrew-mouse, and bat. The difference is still more striking in the ape, (*singe.*) Pl. LXV. fig. 4, is the cranium of the female ape; fig. 3, that of the male.

When one has a collection of brains, moulded in wax from nature, or even in plaster, he can not only determine, with the most scrupulous exactness the convolution, which constitutes the organ of maternity, but still further ascertain precisely the modifications of its external mark on the cranium. The different positions of the brain in the cranium produce modifications, which may sometimes cause the inexperienced observer to hesitate. The following examples will enable the reader to understand my idea; in the ape, a species of monkey, the posterior lobes of the hemispheres extend beyond the cerebellum, as in man

and woman; so that this last is covered and compressed under the posterior lobes, the most posterior convolutions of which, being large and prominent, constitute the organ of maternity. Hence it happens, that the heads of female monkeys in this region are much more rounded and prominent backwards than the heads of male monkeys. (Pl. LXV. fig. 3, 4.) In the dog, the posterior lobes of the hemispheres only cover half of the cerebellum. The head of the female dog, on this account, is less prominent behind than that of the female monkey, but always more protuberant and larger towards the region of the cerebellum, than the head of the male dog of the same variety. In the cat, the posterior lobes of the hemispheres only cover a very small lateral part of the cerebellum. On this account the organ of maternity appears to have a seat much more in front, especially on the cranium. This organ is the second convolution commencing from the median line. It is also larger and more prominent in the female than the male cat, which I can demonstrate in more than a hundred specimens of heads of cats, that I have in my collection. The convolutions form an oblong elevation on each side, the whole length of the parietal bones to the cerebellum. These two elevations are very apparent and palpable, on the superior posterior surface of the cranium of the female cat. Although these crania are still much less prominent behind than those of female dogs, they are yet much larger and more prominent towards the cerebellum than those of male cats. Plate LXXVI. represents, for this purpose, the brain of a monkey, fig. 1; the brain of a male cat, fig. 2; the cranium of the female cat with the mark II. of the organ of maternity, fig. 3; and the cranium of a panther also, with the organ of maternity, marked No. II.

Whoever wishes to give himself the trouble of making a collection of animals, males as well as females, will find, in all species, a confirmation of the remarks I have just made on the difference of the organs

of propagation and the love of offspring in the two sexes. I could wish that all young naturalists might commence their researches by these two organs. Both are easily recognised, and it is very rare to find, as an exception to this rule, a male animal assume, as far as these two organs are concerned, the character of a female. It is well to select for one's collection, males and females of the same variety, and nearly of the same age; for, a great disproportion of age is a circumstance, which may occasion difficulties capable of embarrassing the beginner.

The more numerous the collection is, and the oftener the young naturalist shall have repeated each observation, with more assurance will he await all the objections; there are none that can disconcert him; every step, that he makes in advance, will encourage him to pursue his career, and in a few years he will be convinced, that organology rests upon an unshaken foundation.

The Influence of Castration on the Organ of the Love of Offspring.

Cabanis tells of the method, that every one knows, of making capons hatch and bring up chickens.* "They take a capon, pluck the feathers from his abdomen, rub it with nettles and vinegar, and in this condition of local irritation in which the operation has put him, he is placed upon the eggs. He continues there mechanically at first, to relieve the pain that he feels; he soon begins to feel a succession of unaccustomed impressions within his abdomen, which are rather agreeable to him, which induce him to continue on the eggs during the time necessary for incubation, and the effect of this is to excite in him a kind of factitious maternal love, which continues, like that of

* Relations of the physical with the moral in man.

the hen, as long as the pullets require assistance and protection. The cocks do not interest themselves in this case; they have an instinct that influences them differently....."

As the same method does not succeed with cocks, it follows that the operation of plucking the feathers from the abdomen, and rubbing it with nettles and vinegar, is not the only cause which excites the love of offspring in the capon. I can well conceive, that similar procedures may suffice to awaken the activity of certain dormant organs; but what can produce these irritations where the organs do not exist? If, in the hen, as they would have us believe is the case in the mammalia, it is the ovaries, &c., which constitute the viscera, on which the instinct of taking care of the offspring depends, it would be impossible to excite this instinct in the capon by any procedure whatever. If, as no one will maintain, other viscera are the seat of this instinct, why are these viscera in the cock constantly incapable of exciting it? *The instinct which leads the cock in a different direction*, cannot prevent him from being susceptible of the love of offspring; since there are many males of other species of birds, which cover the eggs and take care of the young; and have not the females also this same *instinct, which leads them in a different direction?*

This observation should excite in naturalists a suspicion, that the love of offspring depends on a part which the capon equally possesses. It is a fact, that the organ of this love exists in male animals of species, where the male takes no care of the young; only it is slightly developed in them. We know, however, cases of dogs and stallions, who have sought with solicitude the young they have engendered, and who have protected them with tenderness and defended them with courage. But it appears to me, that in these animals the organ of the love of offspring acquires a greater development, in consequence of the

ablation of the genital parts, and the diminution of the cerebellum which is the consequence. Let any one compare the cock and the capon, the bull and the ox, the stallion and the gelding, &c. Since I have mentioned this in my large work, I have made a numerous collection of castrated animals of many species. In all those that were castrated in the early period of their life, the organ of maternal love is almost always found evidently more developed than in the perfect animals of the same kind. It can then be easily conceived how this organ is susceptible of a greater excitation in the capon by the irritation of the abdomen, as it is in the hen by the simple influence of the season and more nourishing food.

General Remarks on the Instinct of Propagation and the Love of Offspring.

It is disputed whether we should give to the instinct of propagation the name, physical love, amativeness, generative energy, instinct of reproduction, of propagation, or venereal instinct. To propagate, say they, is neither to engender nor reproduce, it is only a remote consequence of it. I answer, that to engender and reproduce are only a consequence of an act. If an appellation drawn directly from it, had nothing revolting to delicate ears, it would better express what is understood by the propensity for propagation. Physical love and amativeness do not take place, either in animals or in the insane, nor often in the most ardent men. Generative energy does not suit better, since the venereal instinct exists, and often acts without any generative energy. Hence it is much better to preserve an appellation, which is understood by all, and is equally applicable to animals and man. For this reason I have not thought proper to change my first name, — propensity or instinct of propagation.

It has also been wished to change the term love of

offspring, for philoprogenitiveness or philogenesis. As for myself, I prefer, wherever it is possible, words derived from our living languages. The mania for seeking Greek and Arabic words, gives an air of erudition, but renders the reading more difficult and often unintelligible.

The question would be more important, to know if the nomenclature adopted for these two instincts agrees only with one of their modifications, or with these two primitive radical powers. Although I have fixed upon the venereal instinct as a fundamental quality, after having observed it in its extraordinary exercise, I have not denominated it in conformity with its excesses. It was not difficult to abstract it from all its modifications, and reduce this function to its peculiar and essential term. As to the love of offspring, it would hardly be possible to find a more appropriate appellation.

No one will deny, that the instinct of propagation, and that of maternal love, are the two most imperious, essential, and important propensities or instincts. But, from all the facts cited in the exposition of these two instincts, one must needs be beset with an imperturbable attachment for ancient prejudices, should he still wish to seek for the seat of the venereal instinct in the genital parts, or that of the love of offspring in the womb or the breast distended with milk. Then it is proved, not by reasoning, but by irrevocable facts, that the *propensities* also have their legislative organs in the brain. Error was inevitable, so long as we were entirely ignorant of the organization and destination of the brain, and so long as the human race was degraded, by comparing many of its qualities, not only with those of other mammalia, but even with those of birds and insects.

The essential difference, and the gradation of activity of these two instincts, enable us to understand that the expressions, *instinct*, *propensity*, *passion*, are abstractions, and cannot belong to a single general or-

gan. The instinct of propagation is essentially different from that of the love of offspring; this last is more active in the female sex; the other is most so in the male sex; one exists in animals in which the other does not; one may be excessively energetic in one individual, whilst the other is hardly perceived, &c. &c. Both of them have regular gradations, both as it respects different individuals, different ages, different circumstances, from the simple disposition, the nascent propensity, to the most imperious passion. Thus there is disposition, propensity, and passion, in the love of offspring; and there is disposition, propensity, and passion, in the instinct for propagation. Consequently, the disposition, propensity, and passion of the venereal instinct have their seat in the organ of this fundamental quality; and the disposition, propensity, and passion of the love of offspring have their seat in the organ of its appropriate fundamental quality also. So all the affections of these two instincts are nothing more than modifications, affections of their respective organs.

It is thus that I hope to prepare my readers for that philosophy, which alone is in conformity with the nature of man and animals.

Let any one call to mind the history of the discovery of these two fundamental qualities and the seat of their organs, and he will be convinced, that I have neither discovered them by reflection, nor by any induction whatever. I had not the least presentiment, that I should discover the seat of these two instincts in the brain; and yet is there any thing more natural, than to find that instinct of propagation connected with the most essential cerebral part, and placed immediately after the *medulla spinalis*, at the commencement of that series of organs, of the moral qualities and intellectual faculties? What can be more consistent than to see ranged, immediately after the organ of propagation, the organ of that instinct, which is devoted to the preservation of that which it engenders? Unfortunately, arguments of this kind are not felt by the amateurs of mutilation and speculation.

I now return, and I shall frequently do so hereafter, to the opinion of Cuvier, announced in his "Regne Animal," vol 1. p. 54: *that instinct has no visible mark in the structure of the animal.* This is great authority, one certainly well merited; but, in the eyes of naturalists, there is no other irrefragable authority but that of nature. The experience of all ages has proved, that the greatest men have paid tribute to their age by consecrating errors, the ridiculousness and absurdity of which have been generally admitted a few years afterwards. Where would many objects of natural science be, if we had always respected the authorities of Hippocrates, Galen, Celsus, Boerhave, Sydenham, Haller, Lavoisier, &c? And to confine myself within the sphere of my own researches, how often have I not been obliged to combat the declarations, often very insignificant, of Hufeland, Walter, Ackermann, Richerand, Rudolphi, &c. &c. Have not men of the greatest reputation, in their report to the Institute of France, contested the most essential points of our anatomical discoveries, adopted at the present day by those authors themselves, and by all those who have given themselves the trouble to examine them? Should I recoil before the great merit of the Pinels, Esquirols, Fodérés, &c., to prove that the immediate seat of mental alienations is in the brain? Great authorities ought not to have any other influence, than that of engaging us to rectify their errors by a more imposing mass of facts. Very well; the demonstration of the organs of the instinct of propagation, and that of the love of offspring, is the easiest and most evident. Every family, every society, all domestic and wild animals, furnish us with undeniable proofs. I challenge individuals, learned societies, and academies, to make a collection of the brains and heads of men and animals of the two sexes, of perfect and of castrated animals, to observe the energy of their propensities, to repeat my experiments, &c.; and if, after doing this, their conscience will still permit them to declare my

discoveries false, or only doubtful, I will be the first to renounce the whole physiology of the brain.

How will the advocates of the opinion of Cuvier, reply to the following dilemma? Either the brains of all species of animals have the same structure, and impress the same conformation on heads and crania; or the brains of different species of animals are differently organized, and impress a different conformation on their crania. Unquestionably, if the first proposition were true, the different instincts of animals would have no visible mark on their heads. But what naturalist can deny the immense variations of structure of the brain of different species of animals, and the conformation of their crania? That being established, it must either be maintained, that these different organizations of the brains of different species of animals are without an object, without any accordance with the difference of their instincts, and, in a word, that the brain in animals has no function; or, it must be admitted, that these different organizations have different instincts for their result; and, as these different forms of the brain impress different forms on the crania, it necessarily follows, that these different forms, whether of the brain or cranium have different significations. All that is to be done at present is to learn these significations. If they have escaped you, admit it, and confess to the public that you are ignorant of them; but do not commit yourself by maintaining, that a thing does not exist, merely because you are ignorant of it; and that another, who has applied himself for many years to a study, is as ignorant of it, as yourself.

III. *Attachment. Friendship.*

History of its Discovery.

I was requested to take, for my collection, a cast of the head of a lady who was, as they told me, the model of friendship. I took her cast, more out of

kindness than in the expectation of making any discovery, and I endeavoured to get a correct one. On examining this head, I found two great prominences, constituting the segment of a sphere, by the side of the organ of the love of offspring. As, up to that time I had never seen these prominences, which, however were evidently formed by the brain, and exceedingly symmetrical, I considered them as a cerebral organ: but what were the functions of this organ?

In order to get some general view on this point, I inquired of all the friends of the lady, respecting her qualities and faculties. I attempted to learn of the lady herself, what propensities and faculties she believed she possessed. All united in confirming what had been told me, that she had an invincible attachment to her friends. Although her fortune, at different periods, had experienced great changes, and by degrees she had passed from poverty to honors, her feelings for her old friends had never changed. This characteristic trait struck me. The idea occurred to me, that the disposition to friendship might also be founded in a particular cerebral organ. This opinion acquired with me a still greater degree of probability, as the prominences, that I had observed on the head of the lady, were placed immediately above the organ of physical love, and by the side of that of the love of offspring, and these three sentiments have some analogy with each other. Whatever may be the difficulty of making exact observations in man, on the organ in question, and on its functions, the idea, that attachment and friendship depend upon a particular cerebral organ, acquires a degree of probability almost equal to certainty.

Natural History of Attachment and Friendship in Man and Animals.

I shall with reason be accused of calumniating human nature, if I call in question the received opin-

ion, that friendship is a quality essential to man. There is no one who, strong in the testimony of his own heart, does not reject with scorn the abject idea, that it is solely from the want of mutual aid that men are attached to each other; that the state of society is the result of interest and the instinct of propagation. Does not history present us with the most noble examples of the devotion of friends, who gave themselves up as hostages for their friends? The inviolable fidelity of friendship in criminals, sometimes commands our admiration, even when they are most depraved. They have been seen to support tortures and brave death, rather than betray the faith that they have sworn to their accomplices.

He, who feels friendship, lives for others. He alone feels happy in a circle of friends; his friend is his greatest good; he is ready, at every moment, to do every thing, to sacrifice every thing for him; but he expects the same sacrifices. The happiness of his friend is his own happiness; and his sorrows become those of his friend; his heart is inaccessible to envy and malignity.

Where can any one pass more happy days than in the bosom of a people, in whom friendship is a daily virtue? At a banquet, in the social circle, every where we find friends, every where the heart is expanded, and these feelings are reciprocated. The master, the subordinates, the domestics, form but one family; the happiness of the one is the most important business of the other; to be the occasion of happiness to one's equals, is a delight as fervent, as that of receiving a kindness from the hands of friendship.

But further, every one knows the great difference in this respect, that exists between individuals and even those of the same countries. There are men who have never felt the sentiment of friendship, and who find a thousand pretexts for excusing their cold indifference. I know a man, who has often assured me, that he was an enigma to himself. He is of a

very mild character, filled with benevolence for all his acquaintances, and loving his children to excess. To take care of a sick person, he spends day and night. Nothing deters him; but he has never been able to have an idea of what is called friendship, or attachment. Although constantly residing in the bosom of a numerous family, a separation, either by a journey or death, never occasions him the least painful sensation. I know others, whom the unexpected news, either of a misfortune, or the disease of some of their most intimate connexions, has never affected. Who does not know, that there are egotists, for whom self is the whole universe, who will not marry from the fear of imposing upon themselves some slavish obligation, prejudicial to their exclusive interest? Who does not know the difference, that exists between a city, where friendly relations make the delight of society, and a city, where selfishness takes the place of the reciprocal relations of friendship; where the hurry of business, the anxiety for making a fortune, dissipations of every kind, stifle the least symptoms of friendship; where the forms of politeness, and exaggerated and senseless language, are substituted for true sentiments; where vain protestations take the place of kindness; where each individual is but an instrument of pleasure for his neighbour; a mere counter, necessary for the calculation of interest; where all the good services that are rendered you, are the services of speculation; and where for sake of the most frivolous benefit, a connexion of many years' duration is broken with indifference; where the father, mother, husband, wife, brother, sister, &c., that death has just removed, are forgotten from the instant they are buried; where, to recall their memory, is to shock the rules of society and commit an imprudent act; because this recollection would awaken perhaps some disagreeable sensation!

Most animals are susceptible of attachment, if not for man, at least for other animals. We have often observed, that horses and oxen grow lean, when they are deprived of their accustomed companion. In

herds we often see certain animals keep constantly together. In Denmark, among a stud of horses, we observed that those of the same colored hair invariably associated together. The attachment of apes, as well for animals of their own species as for man, exceeds all idea. Every one knows the small species of parrots, called *inseparable*, because they often die, when separated. All of us have admired the friendship which sometimes exists between the tiger and the dog, a lion and a dog, a horse and a dog, or between two dogs. A seal, that I had for a few days, had become so much attached to me, that, when I went out, he made strong efforts to leap from the trough and follow me. The dog defends his master to his last breath, who often has the ingratitude to maltreat him. He dies with grief and hunger on the tomb of his beloved master, and attacks his master's assassins with great fury, even after a lapse of years.* There are examples, and these cases are not very rare, of dogs dying of the joy, occasioned by the return of their master, and others, who, having unexpectedly found their master dead, have instantaneously expired from emotion and grief. In a dog, that had died in this way, we found the heart ruptured. We have seen tame wolves, that felt so much sorrow at the absence of their master, that they obstinately refused all food, and died of hunger.

Great varieties exist in this propensity, in animals as well as in man. There are dogs who can never forget their first master; in vain are they sent to another city at a very considerable distance; they return, and their attachment is stronger than ever. Others, on the contrary, run from house to house, from one person of their acquaintance to another, without ever being faithful to any. It is the same with all animals. I have always had a great number of birds, squirrels,

* The dog of a soldier, who had been killed in a duel, passed days and nights on the tomb of his master; all attempts to remove him were ineffectual; and they were obliged to make a niche in the tomb for this faithful animal.

&c.; some manifested the greatest indifference for me, and others exhibited the strongest attachment.

All these observations concur to prove, that friendship is not at all, as some people pretend, a sentiment founded on the calculations of interest, or, on a sympathy taking its source in a relation between the manner of thinking and feeling; facts oblige us to admit, that this sentiment belongs to a fundamental quality.

On Marriage, in Man and Animals.

It is extremely difficult to discover completely the sphere of activity of an organ or a fundamental quality or faculty. I have, for a long time, compared the crania of all the animals that I had, and of all the individuals that I had ever an oportunity of observing, in order to discover the organ which leads men and animals to contract marriages for life. Marriage has been instituted by the Author of all that exists; but it is hardly possible, but that this should be by means of a particular organization. Still I am constantly in doubt, whether my ideas in this particular are in conformity with nature. Here I am obliged to satisfy myself with probabilities, and whenever I cannot establish myself on facts at every step, I advance with the greater caution.

Most of my readers have no idea that marriage exists in animals, and in our own species it is only regarded as the result of social institutions. Man is not always willing to persuade himself, that, in whatever manner he acts, it is the finger of God, that impresses upon him the first movement.

Certain animals, such as the bull, stallion, dog, never approach the female of their species, except when they feel the want of copulation, and do not exclusively satisfy their desires with one only; and these desires being satisfied, there is no longer any attachment between the male and female; each one takes care of himself.

Other animals, on the contrary, when they feel amorous desires arising within them, select among many females, one towards which they appear attracted by a kind of sympathy; and until they have acquired peaceable possession of her, they combat with ardor other males, that pretend to dispute with them the conquest of the object of their choice. From this moment the union is concluded for life. Conjointly with their companion, they take care of the young born from this union, until they are in a condition to provide their subsistence for themselves. Though the time of propagation is passed, the couple continue in the most affectionate union; they make journeys together; when they are animals that live in herds, they always keep close to each other. In the spring they renew their loves, and continue in this state as long as they both live. It is not until one of the couple perishes, that the other makes a new choice. It is in a similar union, that the fox, marten, wild-cat, mole, eagle, hawk, pigeon, stork, swan,* nightingale, sparrow, &c. live. Marriage for life is then ordained by nature for all these animals; it would be the same with man, if our race, on account of such a multiplicity of propensities, were not subject to so many modifications.

After this exposition the reader will not be astonished, if I apply myself to discover the organic cause of the difference, which exists in this respect in the kind of life, as well in animals as in man. Does marriage result from the action of a single organ? Does it result from the simultaneous action of many organs? What is the organ, or what are the organs the action of which determines it?

Spurzheim believes, that he is able to decide these questions; he thinks, that it is the attachment and friendship of the male and female for each other, which influences them not to forsake each other, after

* They even say, that, in the wild swan, the reciprocal attachment of the pair is such, that, when one dies, the survivor lives in voluntary celibacy for the rest of life.

the instinct of propagation is satisfied, but to remain united, even when the season of their loves is passed.*

I should be also tempted to profess the same opinion, but I confess the facts appear to me to be of a nature to excite some distrust. The dog, the model of attachment among animals, and very ardent in his loves, never lives in a state of marriage. It is true, that sometimes a female dog bestows her favors exclusively on one dog, but these cases are very rare; and, as to male dogs, I doubt if any one has ever occasion to praise their fidelity in love. I have before said, that oxen and horses are susceptible of much attachment, as well for other animals as for man, and still it does not appear that among these animals, even in a state of nature, one male and one female particularly attach themselves to each other.

Spurzheim replies to this, that the modifications in the habits arise from a simple modification of the organ of attachment; the sense of odor and taste are also, says he, differently modified in frugivorous and in carnivorous animals.

It is certain, that modifications of the organ of attachment exist in the different species of animals. Certain animals have a preference, an attachment for individuals of their species; others conceive an affection rather for animals of another species, or, for man; the dog, for instance, attaches himself to his master, and to those persons that he is in the habit of seeing; but I shall not dare to affirm, that marriage can be explained solely by modifications of this nature. It is a fact, that the organ of attachment is placed near those of the instinct of propagation and of the love of offspring; and, if an organ of marriage exists, it should be placed near these three. The instinct of propagation and the love of offspring are common to us with animals; the organ of these propensities ought then to be among the number of cerebral parts, with which animals are endowed, as well as man.

It is further certain, that, where marriage exists,

* The physiognomical system of Drs. Gall and Spurzheim.

there is also attachment and friendship; but it is not true to say, that marriage takes place in all animals susceptible of attachment and friendship. Facts prove even the contrary.

If I could have full confidence in my acquirements in natural history, I would on my part propose an opinion.

It seems to me, that, in all the species where the male and female both concur in taking care of their young, their exists marriage for life; that in those species, on the contrary, where the male contents himself with procreating the young, without attending to their bringing up in the least, the female that first comes, serves him for the satisfying of his desires, and that the essential end of nature is fulfilled without the marriage tie.

The males of certain species, that live in a state of marriage, are not capable of nourishing their young; the roe-buck and the warren rabbit are examples of this; but they defend the female and the young from their enemies, and play with and caress the young, like the mother.

Partridges live together in a family until the moment when the young are capable of propagating; the male is the conductor of it; when he is killed, the family, deprived of its head, becomes entirely the prey of the hunter. When the male partridge escapes the danger, the sportsman does not succeed in destroying his family; for, he instantly leads it beyond the frontier. The male takes care of the young with the female; and, like her, he protects them from the rain with his wings.

While I am passing in review the habits of animals in relation to this point, the cuckoo excites in me some doubts.

Most naturalists appear to admit, that the cuckoo lives in the state of marriage. I have not been able to assure myself of this. As he neither hatches nor nourishes his young, and as he abandons his posterity

entirely to the care of other birds, it would seem, that nature had acted without an object, in instituting marriage with him. Some one pretends to have seen in England the female cuckoo hatch her own eggs and feed her young; but no one has ever seen the male join himself with the female, to divide with her the care of the young. I have very often observed this bird in the time of his loves; he is extremely ardent; we most frequently see many who reciprocally pursue each other; still I have never been able to assure myself, whether the male satisfied his desires with a single female or with many.

There are both men and women who, without any external accidental cause, have an aversion to marriage. If we could read the bottom of their hearts, we should perhaps find there the solution of the enigma. Are such people incapable of attachment and friendship? Do they fear the expenses of a family? Are they egotists to whom we can apply the proverb, *Impius, ut cuculus pater, generat atque relinquit?* *

We shall be able to speak more boldly on this point, as well as upon many others, when we obtain more extensive knowledge of the manners and habits of animals. There are many, of which we are still ignorant even up to this very hour, whether they live in a state of marriage or not; there are others which, we observe, lead a life of celibacy, solely, perhaps, because they are not left to nature; and because more males of their species than females are killed. There are animals, such as the dog and cat, who perhaps would live in a durable union with one female, if their young did not find abundant food in our houses. The wild-cat, for aught I know to the contrary, lives with a single female; certainly the wolf, in certain cases, lives in a state of marriage. I possess the cra-

* There are people who refuse to marry, because they have not been able to obtain the hand of the object of their love. This case is not perhaps very frequent, but it exists. These people appear incapable of an attachment, merely because they are already irrevocably attached for life.

nia of a male and female wolf, that were seen together for many successive years. What I have just said on the state of marriage, will be sufficient to enable the reader to comprehend, why I speak on this subject with so much reserve.

Alienation arising from Attachment.

An excessive development of the organ of attachment may predispose to mania. A peasant woman became insane three times; the first, at the death of her brother; the second, at the death of her father, and the third, at that of her mother. After she had recovered the third time, she came to consult me. As she was very religious, she complained to me of her unfortunate disposition to be afflicted, at the loss of persons who were dear to her, more than religion permits; an evident proof that she had yielded to grief, although she had combated it by motives which were within her reach. Pinel relates some similar cases: "A young man," says he, "after other unfortunate events, lost his father, and some months after a mother that he tenderly loved; hence arose deep and all absorbing melancholy, with loss of sleep, and appetite; and by degrees ensued a most violent mania." *

Two young conscripts joined the army; and in a bloody engagement one of them was killed by a ball at the side of his brother; the other remained motionless and like a statue at this sight. Some days after, he was brought in this condition to his paternal house; his arrival caused the same impression on a third son of the same family; the news of the death of one of his brothers, and the insanity of the other, threw him into such a consternation and stupor, that nothing could better realize a state of icy immobility from fright, that so many ancient and modern poets have painted.

* Pinel on Mental Alienation.

Of Sociability in Animals and Man.

Sociability is another propensity, of which, in spite of all my researches, it has been impossible for me, up to the present time, to discover the material condition. As this propensity is common to man and animals, it requires, that its organ should be among the number of those cerebral parts with which animals are endowed, as well as man; it should also be placed in the neighbourhood of those of which we have already treated; or rather sociability is included in their sphere of action.

I have in another place, vol. I. sec. 2, shown that the causes which are assigned for sociability, are not admissible. Society is neither founded on our wants, nor in general upon calculations of interest. Strong and powerful animals live in herds, as well as weak animals. The black bear of America (frugivorous) lives in herds at Kamschatka, whilst the great brown bear lives always by himself. Some species live in herds the whole year; others only collect together at certain seasons. There are some that only live in society with their own family during summer and winter, and who separate in the spring, the season of their loves. There are many that live in herds formed of couples; in other species still, one male lives surrounded by many females. All these societies, differently modified, are so many institutions of nature.

In all probability, sociability enters into the sphere of action of the organ of attachment, and the different modifications of society belong to as many modifications of this organ. But, it has always appeared to me very difficult, to deduce marriage and sociability from the same source. If, for instance, the love of offspring were the cause of sociability, why do not the stork, roe-buck, and fox live in society like the sheep and man? Many animals live in society without uniting in couples for life; such are the bull, the dog, the stag, and the cock; others live at the same

time in couples and in flocks, as the crow and sparrow; others are united in pairs for life without living in society, as the magpie, fox, marten, and nightingale. The heath-cock and the sea-merle live isolated without a female. The red male pratridge separates from the female immediately after coupling, although this variety is gregarious. The tufted lark lives a solitary life, the common lark lives in flocks, at least during autumn and winter. The wren, (troglodyte of Europe,) the marsh, tomtit, *penduline*, *remis*, live solitary lives. The great tomtit, the blue, the long tailed, and the bearded tomtit, prattler, wren, (motacilla regulus,) live in flocks. The badger lives alone even in her family. Can any one still have recourse to a simple modification of the organ of attachment? It is, no doubt, humiliating to be compelled so frequently to confess our ignorance; but it is the part of prudence, to wait until time shall enlighten us.

I have compared the crania of most of the animals above mentioned, as well as those of many others, whose habits are very different as to sociability or solitary life. I have compared, for instance, the great black raven (*solitaire*) with the crows and the little raven; the tame jackdaw, living in flocks, with the magpie, who lives in society with his family only. I cannot affirm, that this examination has enabled me to distinguish by the inspection of the cranium, the animals that live in society, from those that lead a solitary life: notwithstanding this, it appears very probable that the propensity to live in society, is comprehended in the activity of the organ of attachment.

Certain people feel a particular inclination to live in society. Every thing which surrounds them, acquires by degrees a greater value in their eyes. They become attached to the place of their residence; to their clothes. They are troubled when they are obliged to leave those, whom they have been in the habit of seeing. Who is not acquainted with the disease of home-sickness, so painful, and at the same time so fatal? Can any one conceive, without the

propensity of attachment, that men, transplanted from the most severe climates, under a fine sky and in the midst of every enjoyment, feel themselves pining away, with the desire of seeing again their mountains of ice, and of again living on fish oil? Others seclude themselves even in the midst of a crowd and withdraw from the most various objects; nothing attaches them; they change with indifference their society, dwelling, and residence. From this it follows, that the organ of attachment can only have its minimum of development, in these misanthropes, who, like Timon and Apomantes, have a hatred for all commerce with men.

Of the Seat and External Appearance of the Organ of Attachment.

The convolutions of the brain marked III. (Pl. VIII. IX. X.) constitute this organ. They are generally placed between the organ of the love of offspring, and that of the preservation of self and property; or rather, to the right and left, and outside of the organ of the love of offspring. When the organ of the instinct of propagation, is strongly developed in its superior part, the organ of attachment is placed a little higher than that of the love of offspring.

In the cranium, it is situated in the middle of the edge of the parietal bone, and when it is advantageously developed, forms two distinct annular prominences, or, at least, the cranium is large and prominent in this region. When, on the contrary, the organ of attachment is very slightly developed, the cranium in the same region is narrow and depressed.

See Pl. LXII. the cranium of a man, remarkable for the affection he had for his friends, and who, even in dying, left them proofs of his attachment.

Women are generally more devoted to their friends than men, and manifest an indefatigable activity to render them services. Whoever has gained the

friendship of a woman is sure of the success of the affair, in which she serves him; men are much more easily discouraged in similar circumstances. I have had occasion, a hundred times in my life, to admire in women, the most generous activity in favor of their friends. Who is not astonished at the courage, which a woman displays, when she sees threatened with imminent dangers a husband, whom indiscretion has perhaps a thousand times betrayed? Who does not know instances of the most heroic devotion in such cases? No sacrifice is too great for a woman in serving her friend. When the life of her brother, husband, or father is at stake, she penetrates prisons, she throws herself at the feet of her sovereign. Such are the women of our days, and such history depicts those of antiquity. Happy, I repeat it, is he who has a woman for a friend!

The organization of the head of woman corresponds perfectly with these sublime qualities. Most of the crania of women, in the region indicated, are larger than the crania of men.

In animals susceptible of a great attachment, also, this region is larger and more prominent than in others. The cranium of the dog is particularly remarkable in this respect. We may be convinced of this by examining a collection of the crania of dogs, some of which were very much attached to their master, and others vagabonds by inclination. This organ is singularly developed in the seal, who is not only very susceptible of attachment, but lives in society. The cranium of the sheep, so social, is remarkably distinguished in this respect from that of the roe-buck, who lives, it is true, with his family, but never is gregarious.

The cranium of the sparrow, pigeon, starling, crow, jack-daw, (*corvus monedula, Linn.*) is also larger in the region above indicated, than that of the yellow-hammer, blackbird, magpie, falcon, eagle. The parrot has this region very large and prominent.

Although it may be extremely difficult, on this subject, to collect, in man, a sufficient number of observations which leave nothing more to be wished, it is not the less true, that the natural history of man and animals, concurs with the form of the head, as well in man as in brutes, to prove that attachment or friendship ought to be considered as a fundamental quality, and that the organ of this quality has its seat in the region of the brain and cranium, which has been indicated.

M. Démangeon, who has made a very exact analysis of my large work,* adds his own critical reflections on different subjects. I shall neglect none of his remarks in the sequel of this edition. This is what he says respecting the organ of attachment: "We see, that the reciprocal attachment of animals among themselves, is based on the generative instinct, and in the resemblance and accordance of their other tastes and interests; that is to say, in an analogy of sentiments, that may be called sympathy. The organ of attachment or friendship of our author is, perhaps, only sympathy strengthened by interest, hope, gratitude, &c. On this supposition, would there be a special organ of sympathy, or would this organ be the result of many similar faculties, or, at least, faculties fit to enable us to appreciate in others, those qualities which flatter our tastes, our propensities, and our habits? What would render this probable, is, that, in order to be on good terms with others, we must not oppose their fancies nor their self-love; from this we may see the reason why flattery has so much success, especially when it is founded on an identity of tastes and opinions, or, when it adroitly simulates this identity. It is also certain, that the dog, who has a great number of the tastes of man, attaches himself to him more strongly as he is better understood; it is a matter of observation, that good nature and good will in men do

* Analytical and critical table of the work of Dr. Gall on the nerves, brain, and their automatic and intellectual functions: by J. B. Démangeon.

not belong to inferior minds. From these considerations it would not be unreasonable to derive sympathy, love for offspring, friendship, and benevolence from one and the same source. This would sufficiently well explain why the same religion, same language, government, manners, country, profession, the same opinions, and the same danger, give to benevolence, to sympathy, and to patriotism, an energy which favors, privileges, differences of conditions, and every thing which tends to prevent the equal relations of men with each other, either diminish or destroy. Never will a crew, composed of masters and slaves, afford an example of exalted and universal patriotism, such as was exhibited on board the ship *Vengeur*. Sociability, which is strengthened by sympathy, as well as the necessity of self-preservation, seems to have a mixed origin, and to be extended or restrained, according as the principle of individual preservation, of which property is one means, coincides more or less with sympathy, whence flow vanity and all the frivolities that are called social enjoyments. We see then why the man, whose wants are limited and little varied, like him to whom society is disgusting, voluntarily confines himself to his own family, or admits only one companion to his society."

The tendency to abstract and generalize, is so natural to man, that I can very well conceive the difficulty that I every where meet with, in urging the acknowledgment of the most obvious distinctions. Such objections will always weigh with those, who, fixing their attention on man alone, neglect the economy of animals. The reciprocal attachment of animals is certainly not based on the generative instinct; for, it by no means follows, that all the animals, that have the generative instinct, have also that of attachment, either for the females of their own species, or for their own offspring. Without repeating the examples, that I have already cited in the preceding treatises, are there not even men, who, devoting themselves pas-